OPERATION AND SERVICE MANUAL

RF PLUG-IN UNIT
MODELS 571A-1,
571A-2, AND 571B

© Copyright 1976
SYSTRON DONNER CORPORATION
ONE SYSTRON DRIVE
CONCORD, CALIFORNIA 94518 USA

MICROWAVE DIVISION
SYSTRON DONNER CORPORATION
INSTRUMENT GROUP

PRINTED September 1, 1976
MANUAL P/N 950776

SYSTRON DONNER

EQUIPMENT WARRANTY

Seller warrants equipment of its manufacture against defective materials or workmanship for a period of one year from date of shipment.

The liability of Seller under this warranty is limited, at Seller's option, solely to repair, replacement with equivalent Systron-Donner equipment, or an appropriate credit adjustment not to exceed the original equipment sales price, of equipment returned to the Seller provided that:

The defective equipment is returned to Seller's designated repair location, transportation charges prepaid by Buyer, and,

Seller's examination of such equipment discloses to its satisfaction that defects were not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration by the Buyer.

In no event shall Seller be liable for collateral or consequential damages due to defective equipment.

This warranty does not include mechanical parts failing from normal usage nor does it cover limited-life electrical components which deteriorate with age such as vacuum tubes, batteries, lamps, or accessories not manufactured by the Seller, but which are furnished with the Seller's equipment. Seller's liability is limited to whatever warranty is extended by the manufacturers thereof and transferable to the Buyer.

This warranty is applicable to the original Buyer only and constitutes the sole and exclusive warranty of Seller.

This warranty is in lieu of any other warranty, expressed implied or statutory and no agreement extending or modifying it will be binding upon Seller unless in writing and signed by a duly authorized officer.

SYSTRON DONNER

SERVICE DIVISION

935 Detroit Avenue • Concord, California 94518 • Phone (415) 676-5000 • TWX 910-481-9479

Thank You.

We appreciate your confidence in our products. The Service Division of Systron-Donner will ensure that this instrument is maintained at its specified performance during its warranty period. If assistance is required, please feel free to contact one of our Regional or Local Service Centers listed on the reverse side of this card.

If service, calibration or parts are required beyond the warranty period, please contact the Service Division Center nearest you. They are your representatives.

Will you take some time to help us improve our performance and insure your warranty by completing the postage-free registration card below.

Sincerely,

Richard F. Hall

Richard F. Hall
General Manager

Warranty Registration Card

MODEL NO. _____ SERIAL NO. _____ DATE RCV'D _____

Company _____ Department _____

Name _____ Title _____

Address _____ Phone (_____) _____

City _____ State _____ Zip _____

PRE-SALE ASSISTANCE
- ☐ Excellent
- ☐ Fair
- ☐ Poor

DELIVERY
- ☐ Early
- ☐ On Time
- ☐ Late

INSTRUMENT PERFORMANCE
- ☐ As Expected
- ☐ Good
- ☐ Defective

SERVICE CONTRACT AFTER WARRANTY? ☐ Yes ☐ No ☐ Check Later

PROVISIONING PARTS REQUIRED? ☐ Yes ☐ No ☐ Check Later

COMMENTS: _____

S-D Service Division Centers

NATIONAL

935 Detroit Avenue
Concord, CA 94518
Phone: (415) 825-9810
TWX: 910-481-5780

REGIONAL SERVICE CENTERS

WEST

3662 Katella Ave., Suite 105
Los Alamitos, CA 90720
Phone: (213) 596-1684

NORTHERN CALIFORNIA

735 Palomar Avenue
Sunnyvale, CA 94086
Phone: (408) 733-3133

EAST

71 Grand Avenue
Palisades Park, NJ 07650
Phone: (201) 945-4500

LOCAL SERVICE CENTERS

NEW ENGLAND

29 Gordon Street
Waltham, MA 02154
Phone: (617) 894-0559

WASHINGTON, D.C.

6615 Backlick Road
Springfield, VA 22150
Phone: (703) 451-6500

MIDWEST

2720 Des Plaines Ave., Suite 16
Des Plaines, IL 60018
Phone: (312) 297-5240

SOUTHWEST

312 N. Central Expressway
Suite 212
Richardson, TX 75080
Phone: (214) 231-8106

SOUTHERN CALIFORNIA

3662 Katella Ave., Suite 209
Los Alamitos, CA 90720
Phone: (213) 598-7678

FIRST CLASS
PERMIT NO. 57
CONCORD, CA

BUSINESS REPLY MAIL

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

Postage will be paid by

Systron-Donner Corporation

Service Division
935 Detroit Avenue
Concord, CA 94518

LIST OF EFFECTIVE PAGES

PAGE	CHANGE
i through v	Original
vi	Blank
1-1 through 1-6	Original
2-1 through 2-2	Original
3-1 through 3-11	Original
3-12	Blank
4-1 through 4-18	Original
5-1 through 5-36	Original
6-1 through 6-21	Original
6-22	Blank

NOTE 1) All Original pages are dated 9-1-76 (September 1, 1976)

NOTE 2) Please report errors and omissions in this manual to Systron-Donner Corporation, 14844 Oxnard Street, Van Nuys, California 91411. This report should include the manual number and title, date of last change, and exact location (by page, paragraph, line, or figure) of the error. Also include the model number, serial number, and numbers of modifications or options (if any) pertinent to your instrument.

TABLE OF CONTENTS

SECTION/ PARAGRAPH	TITLE	PAGE
SECTION 1	INTRODUCTION AND DESCRIPTION	1-1
1.1	SCOPE OF MANUAL	1-1
1.2	DESCRIPTION	1-1
1.3	OPTIONS AND ACCESSORIES	1-3
1.3.1	Option M27	1-3
1.3.2	Option M28	1-3
1.3.3	Option M29	1-3
1.3.4	Model 593 Flexible Plug-in Extension	1-3
1.4	SPECIFICATIONS	1-3
SECTION 2	INITIAL INSTRUCTIONS	2-1
2.1	UNPACKING AND INSPECTION	2-1
2.1.1	Removing Contents	2-1
2.1.2	Inspection	2-1
2.2	PREPARATION FOR USE	2-1
2.3	REPACKAGING FOR SHIPMENT	2-2
2.4	SHIPPING METHOD	2-2
2.5	INSURANCE	2-2
2.6	RETURNS FOR REPAIR	2-2
SECTION 3	OPERATION	3-1
3.1	GENERAL	3-1
3.2	CONTROLS, INDICATORS, AND CONNECTORS	3-1
3.3	OPERATING NOTES	3-8
3.3.1	First Time Operation	3-8
3.3.2	Internal Modulator	3-8
3.3.3	Leveling	3-8
3.3.4	Band Selection	3-8
3.3.5	FM Inputs	3-8
3.3.6	Display Blanking	3-9
3.3.7	Detectors	3-9
3.3.8	Retrace Transients	3-9
3.3.9	Power Meter Measurements	3-9
SECTION 4	THEORY OF OPERATION	4-1
4.1	GENERAL	4-1
4.2	RF CIRCUITS	4-1
4.2.1	Band 1 Operation	4-1
4.2.2	Band 2 Operation	4-3
4.2.3	Band 3 Operation	4-3
4.2.4	Band 4 Operation	4-3
4.3	TUNING AMPLIFIER FUNCTIONS	4-4
4.3.1	General	4-4
4.3.2	Single-Band Operation	4-4

TABLE OF CONTENTS (Continued)

SECTION/ PARAGRAPH	TITLE	PAGE
4.3.3	Continuous Band Operation	4-6
	Sweep Comparators	4-6
	Sweep Ramp Inverter	4-6
	Band 1	4-6
	Band 2	4-6
	Band 3	4-6
	Sweep Timing Relationships	4-7
4.3.4	Tracking Voltage Output	4-7
4.4	YIG DRIVERS	4-7
4.4.1	General	4-7
4.4.2	Operating Power	4-8
	Overvoltage Protection	4-8
	Reverse Polarity Protection	4-8
4.4.3	Bias Switching	4-8
4.4.4	Tuning Circuits	4-8
	Tuning Amplifier	4-10
	Tuning Current Limit	4-10
	Quieting	4-10
4.4.5	External Tuning Inputs	4-10
4.5	BAND SELECT FUNCTIONS	4-10
4.5.1	General	4-10
4.5.2	Single Band Operation	4-11
	Band 1	4-11
	Band 2	4-13
	Band 3	4-13
4.5.3	Continuous (Band 4) Operation	4-14
	Band Selection	4-14
	Sweep Stop	4-14
	Display Blanking	4-14
	Am Off	4-14
4.6	AMPLITUDE CONTROL FUNCTIONS	4-15
4.6.1	Modulators	4-15
4.6.2	Control Voltage Generators	4-15
4.6.3	Operating Modes	4-15
	Leveling Off Mode	4-15
	Internal Leveling Mode	4-17
	External Leveling Mode	4-17
4.6.4	UNLEVELED Indicator	4-17
	Leveling Off Mode	4-17
	Internal and External Leveling Modes	4-17
4.7	POWER SUPPLIES	4-18
4.7.1	+15 Volt Supply	4-18
4.7.2	-15 Volt Supply	4-18

TABLE OF CONTENTS (Continued)

SECTION/ PARAGRAPH	TITLE	PAGE
SECTION 5	MAINTENANCE	5-1
5.1	GENERAL	5-1
5.2	ROUTINE MAINTENANCE	5-1
5.3	PERFORMANCE CHECK	5-2
5.3.1	Equipment Required	5-2
5.3.2	Alternate Test Equipment	5-3
	Power Meter	5-3
	Directional Detectors	5-3
5.3.3	Initial Setup	5-3
5.3.4	Frequency Accuracy	5-4
5.3.5	Power Output and Internal Leveling Flatness	5-4
5.3.6	Off-Leveling Power Variation	5-9
5.3.7	Residual Amplitude Modulation	5-11
5.3.8	Residual Frequency Modulation	5-15
5.3.9	Spurious and Harmonic Content	5-19
5.4	CALIBRATION	5-21
5.4.1	Equipment Required	5-21
5.4.2	Plug-in Extender	5-21
5.4.3	Test Point and Adjustment Location	5-22
5.4.4	Initial Setup	5-22
5.4.5	Frequency Calibration	5-22
	A4 Yig Driver	5-22
	A5 Yig Driver	5-26
	A2 Range Amplifiers	5-26
	Continuous Sweep Adjustments	5-27
5.4.6	Amplitude Calibration	5-29
	High Band Sampler	5-29
	Detector Tracking	5-29
5.5	TROUBLE ISOLATION AND REPAIR	5-31
5.5.1	Initial Checks	5-31
5.5.2	Repair	5-31
SECTION 6	DRAWINGS AND PARTS LISTS	6-1
6.1	PARTS LISTS	6-1
6.2	DRAWINGS	6-1
6.3	REPLACEMENT PARTS	6-1

LIST OF ILLUSTRATIONS

FIGURE	TITLE	PAGE
1.1	571A/571B Major Components	1-2
3.1	Front-Panel Controls, Indicators, and Connectors (Sheet 1 of 2)	3-2
3.1	Front-Panel Controls, Indicators, and Connectors (Sheet 2 of 2)	3-3
3.2	Rear-Panel Controls and Connectors	3-6
3.3	Display Details (Sheet 1 of 2)	3-10
3.3	Display Details (Sheet 2 of 2)	3-11
4.1	571A/571B Block Diagram	4-2
4.2	Tuning Amplifier Functions Block Diagram	4-5
4.3	YIG Driver Block Diagram	4-9
4.4	Band Select Logic Block Diagram	4-12
4.5	Amplitude Control Functions Block Diagram	4-16
4.6	Voltage Regulators Simplified Schematic Diagram	4-18
5.1	Top-Panel Adjustments	5-23
5.2	571A Bottom-Panel Test Points and Adjustments (Sheet 1 of 2)	5-24
5.2	571A Bottom-Panel Test Points and Adjustments (Sheet 2 of 2)	5-25
5.3	Waveforms	5-32

LIST OF TABLES

TABLE	TITLE	PAGE
1.1	571A/571B Specifications	1-4
3.1	Front-Panel Controls, Indicators, and Connectors	3-1
3.2	Rear-Panel Controls and Connectors	3-5
5.1	Test Equipment for Performance Check	5-2

SECTION 1

INTRODUCTION AND DESCRIPTION

1.1 SCOPE OF MANUAL

This instruction manual provides information and operating instructions for Systron-Donner Model 571A and 571B RF Plug-ins. Refer to the 540-Series Multiband Sweeper instruction manual for complementary information on the sweeper mainframe.

1.2 DESCRIPTION

The 571A and 571B Series of RF plug-ins are used in Model 540, 540A, and 540B Sweeper mainframes. Figure 1.1 shows major components of a 571A. The 571A-1 and 571B cover 10 MHz to 4.2 GHz in three bands and can sweep each band individually, or sweep the entire 10 MHz to 4.2 GHz range continuously by automatically switching from band to band. Model 571A-2 covers 10 MHz to 2.2 GHz in two individual bands or continuously.

All units use a solid-state fundamental-frequency oscillator to generate the band 2 output. This oscillator is YIG (Yttrium-Iron-Garnet) tuned. Beat-frequency techniques are used to generate the band 1 output; the band 2 oscillator output is mixed with the output of a fixed local oscillator and passed through a bandpass filter and amplifier.

A second fundamental-frequency, YIG-tuned oscillator is used in the 571A-1 and 571B to generate the band 3 output of 2.0 to 4.2 GHz.

All units include an internal leveling sampler (directional detector), as well as provision for operation in unleveled or externally-leveled output modes. Built-in step attenuator options are available which permit output power control of the plug-in over a dynamic range of at least 79 dB in internally-leveled mode, 89 dB in unleveled mode, and 75 dB in externally-leveled mode.

Major components of the 571A/571B series RF plug-ins include the continuous sweep mother board, plug-in YIG driver board(s), a connector board, and the RF subassembly, as well as the front and rear panel components.

The mother board includes all circuitry required for band selection in single-band or continuous sweep modes of operation, all amplitude modulation circuits, including leveling amplifier, display blanking and tracking voltage components, and ±15 volt regulator.

The plug-in YIG driver boards (two in 571A-1 and 571B, one in 571A-2) convert the frequency-controlling voltage from the 540-series mainframe into current drive for the oscillator modules. Each YIG driver board is custom-tailored for the oscillator it drives; even though two YIG driver boards may have identical part numbers, they are not directly interchangeable, and boards from other 571A or 571B plug-ins should not be used as replacements without recalibration and reslection of certain components.

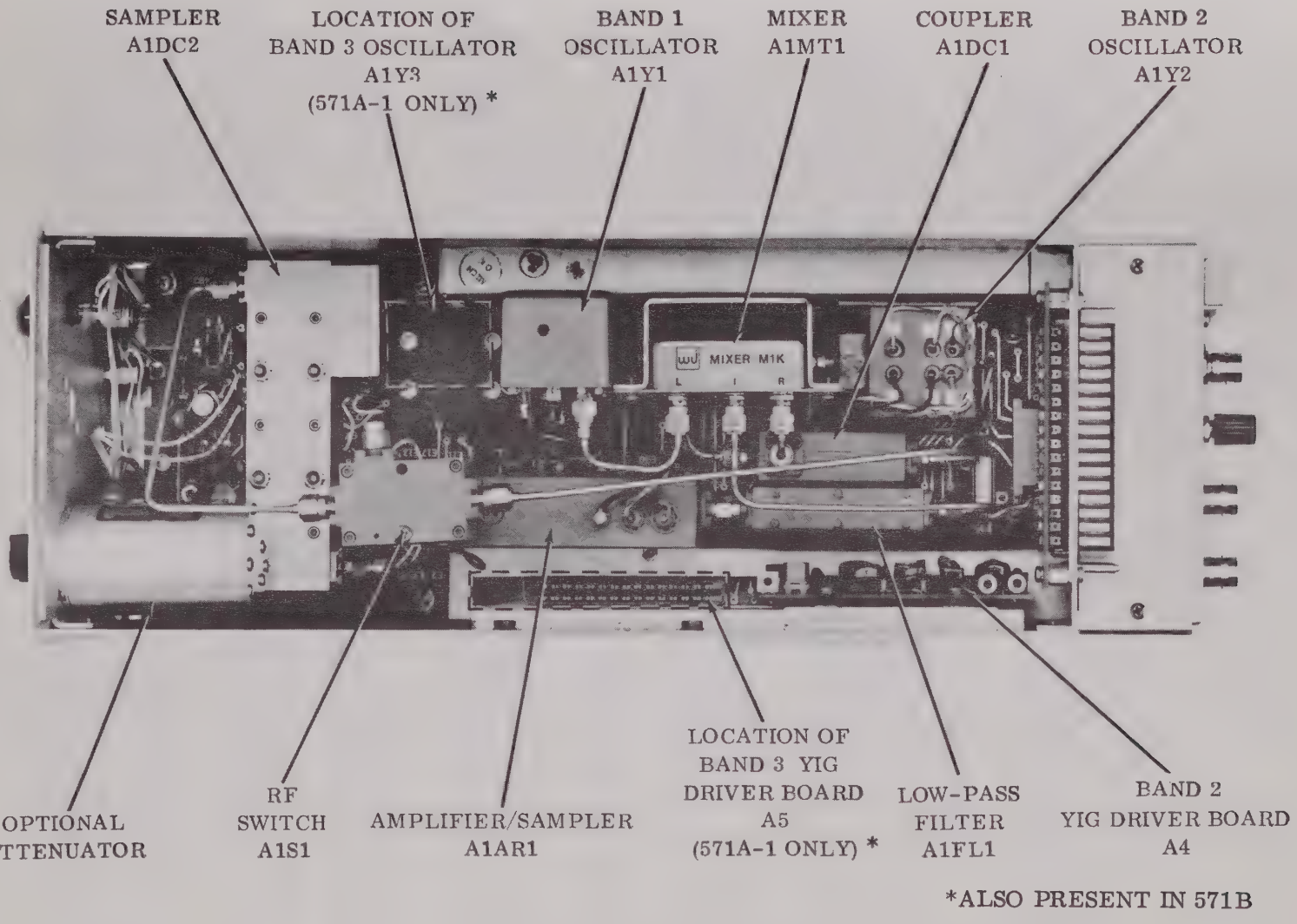


Figure 1.1 571A/571B Major Components (571A-2 Shown)

The connector board, located at the rear of the plug-in, connects the Model 540-Series Sweeper with the mother board and the RF subassembly. Plug-in ribbon cables are used throughout the unit for module interconnections, resulting in a minimum of point-to-point wiring. This technique simplifies assembly and disassembly considerably.

The RF subassembly is similar in all units, but the 571A-2 does not include an oscillator module for band 3. Mounted to the subassembly are all oscillators, a mixer, a directional coupler, a filter, an amplifier/sampler, a solid-state bandswitch, an output sampler, and all RF cables. For ease of maintenance, all active RF components are connected to the RF subassembly board through push-on connector pins.

1.3 OPTIONS AND ACCESSORIES

1.3.1 Option M27. This 60-dB step attenuator (0 to 2.2 GHz range) is used with the 571A-2 and steps from 0 to 60 dB in 10-dB steps; it is usually ordered in conjunction with Option M28.

1.3.2 Option M28. This 10-dB step attenuator (0 to 2.2 GHz range) is also used with the 571A-2 and steps from 0 to 10 dB in 1-dB steps; it is usually ordered in conjunction with Option M27.

1.3.3 Option M29. This 69-dB step attenuator comprises separate 10 dB/step and 1 dB/step attenuators covering the 0 to 4.2 GHz range, and may be ordered with the 571A-1 or 571B.

1.3.4 Model 593 Flexible Plug-in Extension. The plug-in may be operated outside the sweeper mainframe using this three-foot extension cable to allow access to the plug-in for trouble isolation.

1.4 SPECIFICATIONS

Specifications for Model 571A-1, Model 571B, and Model 571A-2 are listed in Table 1.1.

NOTE

All specifications are a combination of 571A/571B RF plug-in and 540-series mainframe; worst case.

Table 1.1 571A/571B Specifications

CHARACTERISTIC	SPECIFICATION	
	571A-1/571B	571A-2
FREQUENCY BANDS		
Band 1	Rated 10-1000 MHz Usable 5-1000 MHz	Rated 10-1000 MHz Usable 5-1020 MHz
Band 2	Rated 1000-2000 MHz Usable 980-2020 MHz	Rated 1000-2000 MHz Usable 980-2200 MHz
Band 3	Rated 2.0-4.2 GHz Usable 1.9-4.2 GHz	Not used
Band 4	10-4200 MHz	10-2200 MHz
POWER OUTPUT (Leveled, into 50Ω)		
Band 1	10 dbm min.	10 dbm min.
Band 2	12 dbm min.	12 dbm min.
Band 3	10 dbm min. to 4.0 GHz 9 dbm min. to 4.2 GHz	--
Band 4	10 dbm min. to 4.0 GHz 9 dbm min. to 4.2 GHz	10 dbm min.
POWER VARIATION		
Unleveled, All Bands	± 4 dB max.	±4 dB max.
Externally Leveled, All Bands	±.05 dB plus power sampler error	±.05 dB plus power sampler error
Internally Leveled	± 1.0 dB from 10-4200 MHz	± 1.0 dB from 10-2200 MHz
FREQUENCY ACCURACY (@ 25°C)		
Bands 1 and 2	±10 MHz or ±1% of indicated value	±10 MHz or ±1% of indicated value
Band 3	±1% of indicated value	--
Band 4	±25 MHz or ±2% of indicated value	±25 MHz or ±2% of indicated value

Table 1.1 571A/571B Specifications (Continued)

CHARACTERISTIC	SPECIFICATION	
	571A-1/571B	571A-2
SPURIOUS SIGNALS (All Bands)		
Harmonic	-20 dB at specified minimum leveled power output	
Non-Harmonic (>1 MHz from F_0)	60 dB below maximum output except Band 1, which is 25 dB at +10 dBm, 30 dB at +7 dBm	
RESIDUAL AM INDEX AT MAXIMUM OUTPUT		
Unleveled	-46 dB	-46 dB
Leveled	-40 dB	-40 dB
RESIDUAL FM (1 Hz to 30 kHz Bandwidth)		
Band 1 and 2 (CW Mode)	20 kHz peak	20 kHz peak
Band 3 (CW Mode)	20 kHz peak	--
Band 4 (CW Mode)	30 kHz peak	30 kHz peak
FREQUENCY STABILITY, % of F_0 (All Bands)		
Temperature Change	±1 MHz or ±0.03%/°C	±1 MHz or ±0.03%/°C
Load VSWR 1:1 to 3:1, any phase	±0.25%	±0.25%
6 dB RF Power Change	±0.25%	0.25%
10% Line Voltage Change	±0.001%	±0.001%
ΔF SWEEP RANGE		
Band 1	±50 MHz	±50 MHz
Band 2	±52 MHz	±61 MHz
Band 3	±115 MHz	--
Band 4	±210 MHz	±110 MHz

Table 1.1 571A/571B Specifications (Continued)

CHARACTERISTIC	SPECIFICATION	
	571A-1/571B	571A-2
TEMPERATURE RANGE		
Operating	0 to +55°C	0 to +55°C
Non-operating	-55° to +85°C	-55° to +85°C
UNLEVELED INDICATOR	Front-panel lamp lights when output power is unleveled.	
POWER OUTPUT CONTROL	Front-panel control provides >20 dB of unleveled power control, > 10 dB of internally leveled power control, and > 6 dB of externally leveled power control. Retrace blanking >40 dB.	
LEVELED-UNLEVELED CONTROL	Front-panel switch selects either internally leveled, unleveled, or externally leveled operation.	
EXTERNAL DETECTOR INPUT	Front-panel BNC connector with adjustable sensitivity.	
FM INPUT	Rear-panel connector. Sensitivity approximately 10 MHz/V; 10 kΩ impedance wide mode. Narrow mode sensitivity approximately 250 kHz/mA; 0.5 Ω input impedance.	
RF OUTPUT:	Front-panel precision stainless Type N female connector.	

SECTION 2

INITIAL INSTRUCTIONS

2.1 UNPACKING AND INSPECTION

The instrument is shipped in a specially constructed container to provide maximum protection to the equipment during transit. Use care when unpacking to prevent damage to the equipment, such as cabinet finish, controls, indicators, connectors, etc.

2.1.1 Removing Contents. To remove the instrument from the shipping container, cut and fold back outer carton top flaps, remove top protective cushion, lift instrument clear of shipping container, open dust protection bag, and remove equipment.

2.1.2 Inspection. The instrument was carefully tested and inspected prior to shipment. Inspect the instrument for damage incurred during shipment. If the instrument is damaged in any way, see the warranty and repair notice at the front of this manual.

2.2 PREPARATION FOR USE

Each RF plug-in is supplied with a metal dial drum for frequency readout in the 540 sweeper.

a. Insert the RF plug-in into the rectangular hole at the right-hand side of the 540, 540A, or 540B.

b. Rotate the small knob at the bottom of the front panel at least five turns ccw, then lock the plug-in in place by turning the knob cw until it is tight.

c. If necessary, install the dial drum in the 540-series mainframe, following steps d through h.

d. Remove the top cover of the instrument; it is held in place with two screws.

NOTE

Some 540/540A/540B mainframes have a top-cover access door to the dial drum. It is not necessary to remove the top cover to install a dial drum in these units.

e. Face the instrument, holding the dial scale drum with its gear to the left and smooth, rounded end knob to the right.

f. Push the smooth knob into its mating receptacle near the plug-in compartment shield. The spring will give way, allowing you to lower the left side of the drum.

g. Snap the drum into place and align the locating key with the mating groove in the left side of the drum assembly.

h. Rotate the BAND SELECT knob to ensure smooth operation of the drum assembly.

2.3 REPACKAGING FOR SHIPMENT

If the instrument is to be packaged for re-shipment, use the original shipping container and packaging. If the original packaging has been discarded or is not in condition for reuse, perform the following packaging procedure:

a. Wrap the instrument in a heavy paper wrapping or plastic protective covering.

b. Place a protective cushion in the bottom of the shipping carton and place the instrument on the cushion.

c. Surround the remaining sides and top with additional protective cushions to provide support of the instrument without resting it on the controls or connectors.

2.4 SHIPPING METHOD

This instrument should be shipped only by truck freight, rail freight, air freight, or parcel delivery service. If it is shipped by parcel post, damage is likely to occur. Systron-Donner is not responsible for units damaged in shipment to the factory for repair, whether such units are in warranty or not.

2.5 INSURANCE

Insure the unit for full value whenever it is shipped.

2.6 RETURNS FOR REPAIR

Be sure to fully identify any instrument that is returned to Systron-Donner for repair of any kind, in-warranty or not. The paperwork with the unit must show the instrument serial number, malfunction or problem to be corrected, and the exact address to which the instrument should be returned when repairs are completed.

SECTION 3

OPERATION

3.1 GENERAL

This section contains information on the functions and uses of the controls and indicators, and operating notes for the instrument.

CAUTION

TO AVOID POSSIBLE DAMAGE TO THE INSTRUMENT, DO NOT ATTEMPT TO OPERATE IT UNTIL YOU HAVE READ AND UNDERSTOOD THIS SECTION.

3.2 CONTROLS, INDICATORS, AND CONNECTORS

Front panels of the 571A and 571B plug-ins are shown in Figure 3.1 (Sheets 1 and 2). Control functions are identical, and index numbers in Table 3.1 refer to the controls, indicators, and connectors called out on both front panels. Rear-panel controls and connectors are shown in Figure 3.2 and described in Table 3.2.

Table 3.1 Front-Panel Controls, Indicators, and Connectors

FIG. 3.1 INDEX	ITEM	FUNCTION
1	UNLEVELED Indicator	Red light-emitting diode (or backlighted placard). Illuminates to indicate that LEVELING OFF pushbutton has been depressed, or that the setting of the POWER control is too high when the LEVELING INT or LEVELING EXT pushbutton is depressed; the indicator will illuminate when the external leveler is disconnected or functioning abnormally in LEVELING EXT.

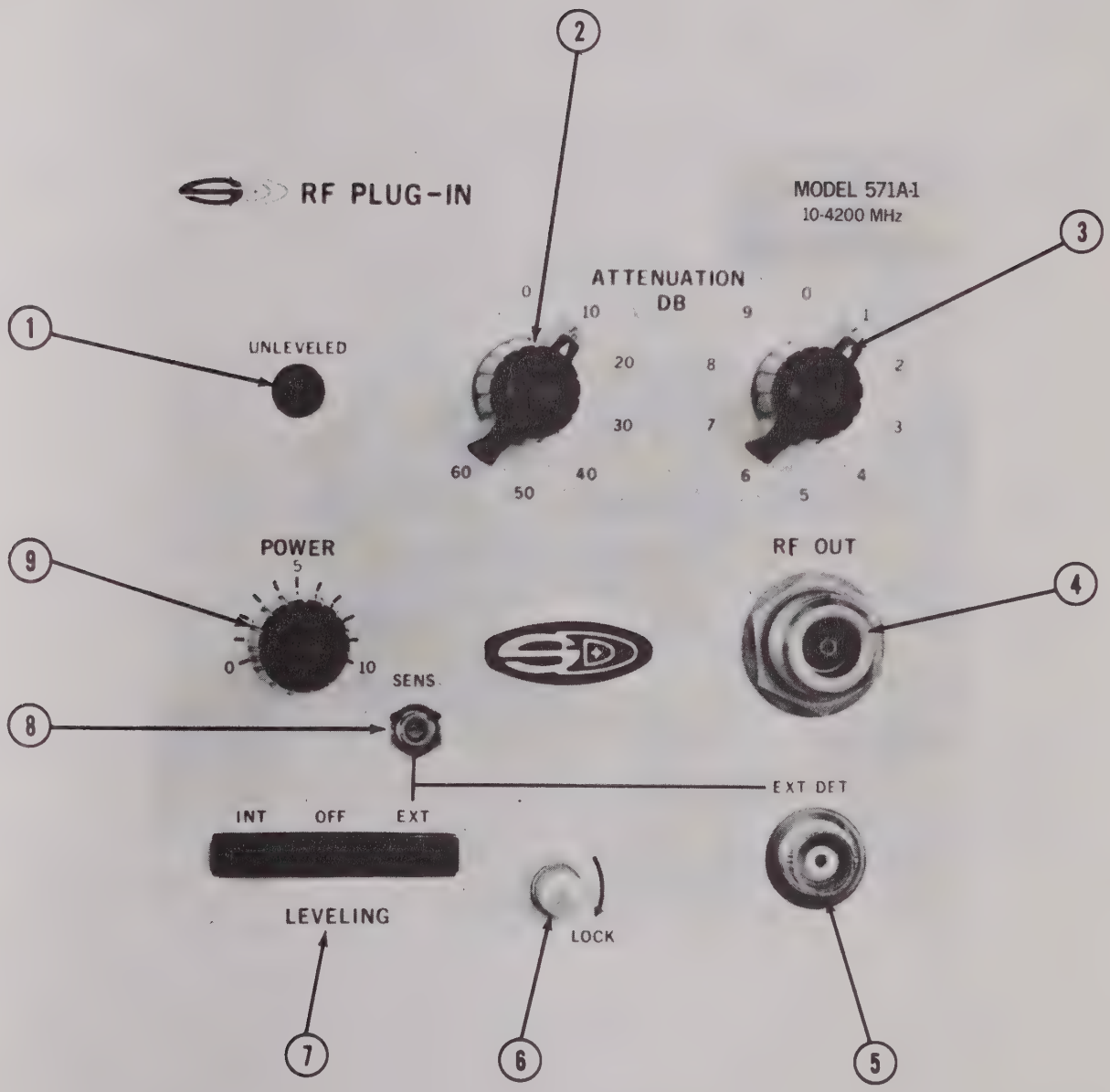


Figure 3.1 Front-Panel Controls, Indicators, and Connectors
(Sheet 1 of 2)

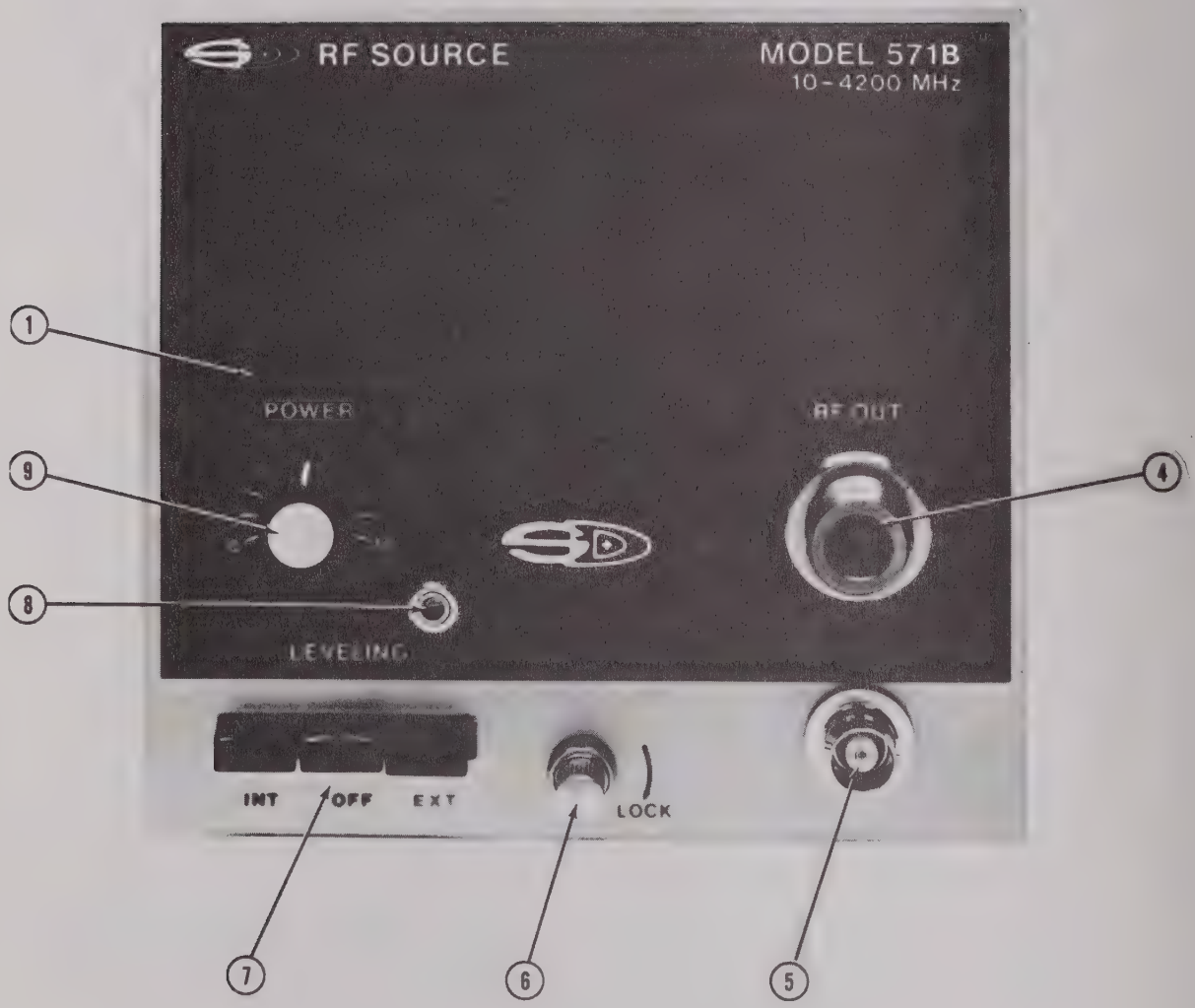


Figure 3.1 Front-Panel Controls, Indicators, and Connectors
(Sheet 2 of 2)

Table 3.1 Front-Panel Controls, Indicators, and Connectors (Continued)

FIG. 3.1 INDEX	ITEM	FUNCTION
2 & 3	Attenuator Options	Black knob/pointer (one or two), added with attenuator options M27, M28, M29. M27 for 571A-2 is six steps of 10 dB each, M28 is 10 steps of 1 dB each. M29 for 571A-1/571B includes a 6-step attenuator (10 dB/step) and a separate 9-step attenuator of 1 dB/step.
4	RF OUT Connector	Precision Type N connector. The RF output is fed to this point; output impedance is 50 Ω.
5	EXT DET Connector	Isolated BNC connector. The external detector signal for all bands is fed through this connector.
6	Locking Screw	Knurled knob. Used to lock plug-in in place in mainframe. NOTE: This knob must be tightened to ensure low noise and proper seating of the interface connector.
7	LEVELING Switches	Black pushbutton switches; interlocked. Select mode of amplifier leveling used:
	INT Position	When the LEVELER switch is set to INT, the RF output is leveled at the RF OUT connector of the plug-in without using an external detector.
	OFF Position	The RF output is unleveled, but the RF LEVEL control may be used for control. Maximum peak power output is available in this position.
	EXT Position	The plug-in may be externally leveled. In the EXT position, an external negative voltage at the EXT DET connector is used to control the RF output over the frequency range of the unit. There is no control of power level when the leveler input is disconnected; the output is either fully on or fully off.

Table 3.1 Front-Panel Controls, Indicators, and Connectors (Continued)

FIG. 3.1 INDEX	ITEM	FUNCTION
8	SENS Adjustment	Screwdriver-adjust potentiometer. Acts as a video load for the external detector for fastest response and as an input attenuator to adjust for proper leveling with external leveler. Does not affect internal leveler. Range: 22 Ω to 5 kΩ.
9	POWER Control	Black knob/potentiometer. Controls the RF output amplitude of all bands of the plug-in. This control typically has a range of over 30 dB, unleveled.

Table 3.2 Rear-Panel Controls and Connectors

FIG. 3.2 INDEX	ITEM	FUNCTION
1	DISPLAY BLANKING Connector	BNC connector. This connector supplies a -10 V pulse during sweep retrace or band crossover to blank the intensity circuits of the Model 7000 or other display unit. This connector, rather than the rear-panel 540* BLANKING connector, should be used to blank the display if you wish to eliminate the intensity dots at the band crossover points in continuous sweep mode.
2	TRACKING VOLTAGE OUTPUT Connector	BNC Connector. An adjustable output signal which tracks with the sweep signal is available at this point; generally used with network analyzers or to drive other voltage-controlled tracking analyzers. Maximum output level is 0 to +5 V in single-band operation; maximum level is variable from +5 to +15 V in continuous band operation.

*Or 540A, 540B

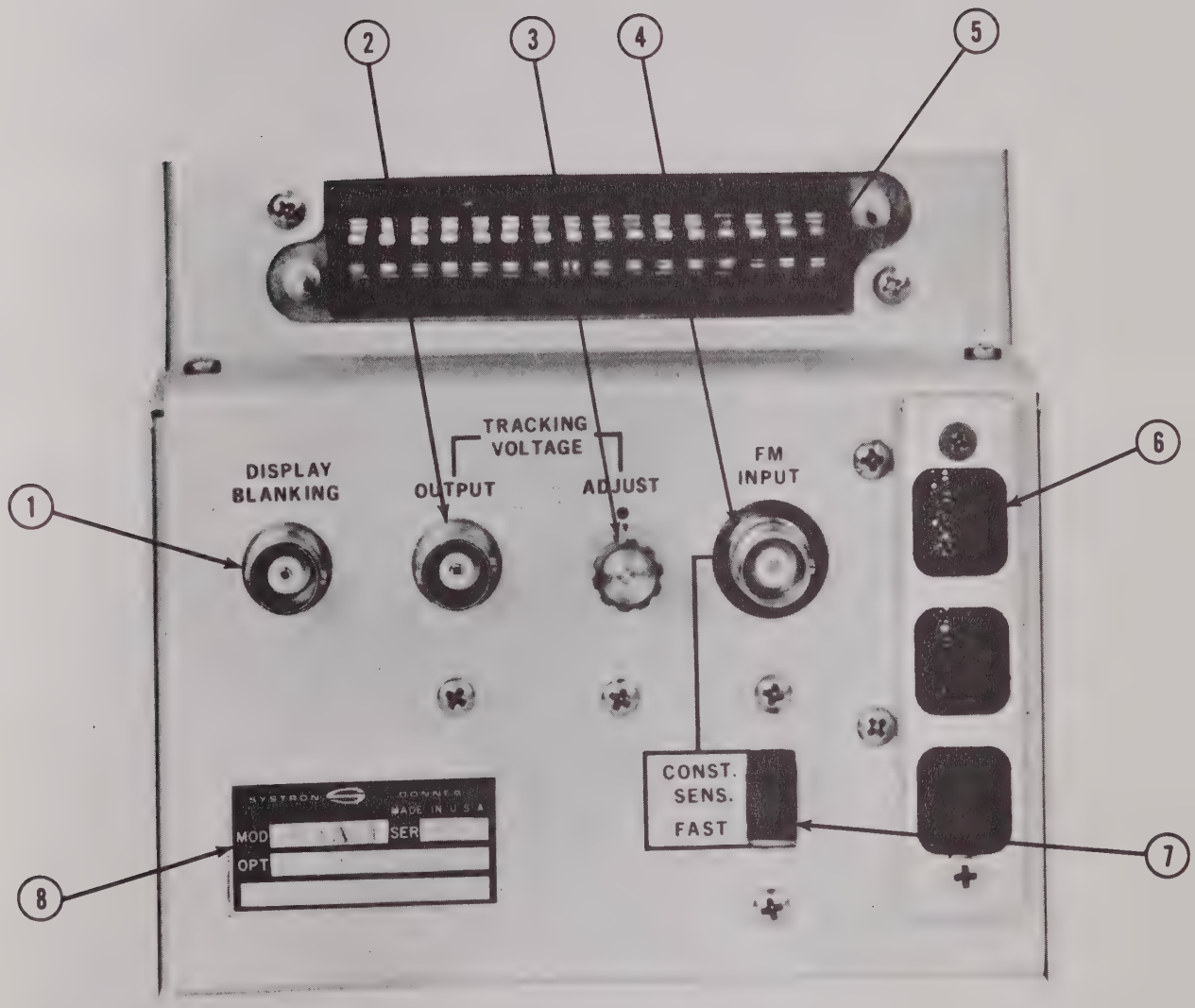


Figure 3.2 Rear-Panel Controls and Connectors

Table 3.2 Rear-Panel Controls and Connectors (Continued)

FIG. 3.2 INDEX	ITEM	FUNCTION
3	TRACKING VOLTAGE OUTPUT Control	Red knob/potentiometer. Operational in continuous mode only. Adjusts the maximum tracking voltage amplitude to any level between +5 and +15 V.
4	FM INPUT Connector	Isolated BNC connector. The current mode signal for narrow FM'ing or the voltage mode signal for wide FM'ing may be fed in at this point.
5	Interface Connector	32-pin connector. Mates to connector in 540*plug-in compartment, allowing operating and signal voltages to be passed between the units.
	WARNING PINS 18, 20 AND 21 CARRY LETHAL VOLTAGE.	
6	Air Intake Filter	Refer to Section 5 for replacement/cleaning instructions.
7	FM INPUT FAST/CONST SENS Switch	Slide switch. Selects mode of phase locking or FM'ing the selected oscillator:
	FAST Position	The FM input from J4 is connected directly to the fast FM coil in the selected oscillator module; frequency response is narrow.
	CONST SENS Position	The input from J4 is connected to both YIG driver boards; sensitivity is typically 10 MHz/V.
8	Label	Shows Model Number and Serial Number of plug-in.

*Or 540A, 540B

3.3 OPERATING NOTES

3.3.1 First Time Operation. To check a new 571A[1] plug-in for proper operation on arrival, perform steps s through ap of Paragraph 3.3 of the instruction manual for the Model 540[2] Sweeper Mainframe.

3.3.2 Internal Modulator. The 540[2] internal 1 kHz modulator drives the modulator of the 571A[1] with a square wave, reducing the RF output of the plug-in on positive 1 kHz peaks. Most VSWR amplifiers and ratiometers will respond to the demodulated 1 kHz signal. If one of these units is being used, the 1 KHZ ADJ control on the rear panel of the 540[2] should be tuned for maximum response of the meter in use before measurements are made. Tuning the plug-in modulating frequency to that of the VSWR amplifier will considerably increase the measurement accuracy and signal-to-noise ratio.

3.3.3 Leveling. Leveling is the process which overcomes the natural tendency of RF sources to generate different power levels at different frequencies due to resonances, losses, and other frequency-sensitive factors. The desired end result is identical power level at all frequencies. Internal leveling in the 571A[1] results in a power level at the RF OUT connector that is essentially flat over the entire frequency range.

To be most useful, leveling should be accomplished as closely as possible to the point of measurement. Where greatest measurement precision is required, external leveling may be desirable above 500 MHz due to the effects of standing waves in the coaxial cables and frequency sensitivities in other coaxial components in a given test setup. When external leveling is used, the power level at the output of the leveler is essentially identical for all output frequencies. The front-panel SENS adjustment should be set to the position which produces the desired sensitivity (mV/mW) and best square-law response.

3.3.4 Band Selection. Band selection is determined by the setting of the 540[2] front-panel BAND SELECT switch. When this switch is set to the Band 1 position, the solid-state RF switch fully attenuates the outputs from the band 2 and 3 RF sources, and allows only the output of the band 1 RF source to pass with minimum attenuation. The action is similar when the BAND SELECT switch is set to any ot the other single-band positions. In the 571A-2, the Band 3 switch position is not functional.

When the band switch in either unit is set to the Band 4 position, the continuous sweep circuitry of the 571A[1] is used to operate all single bands sequentially for each 0 to -10 V sweep ramp from the mainframe.

3.3.5 FM Inputs. The 571A[1] may be frequency modulated in two ways: When the rear-panel FAST/CONST SENS switch is set to FAST, FM INPUT connector J4 feeds the fast FM coil of both oscillators in series. A current driver is required; maximum current is + or - 100 mA. The shell of the FM INPUT connector is isolated from ground so that remote current sensing may be used. The sensitivity varies with oscillator frequency.

[1] Or 571B
[2] Or 540A, 540B

When the switch is set to WIDE, J4 feeds the YIG (oscillator) driver boards rather than feeding the oscillator directly. A voltage source is required; sensitivity is constant at 10 MHz/volt for any frequency.

The output of a discriminator is often used to lock the output frequency of the 571A[1] oscillator to an external standard; AC-coupled audio-frequency outputs are often used when it is desirable to generate a discrete frequency or swept FM signal.

3.3.6 Display Blanking. In addition to the display blanking output described in Paragraph 3.4.6 of the Model 540[2] instruction manual, all continuous sweep RF plug-ins include a display blanking output connector on the rear panel of the plug-in.

In test situations where it is desirable to eliminate the band crossover markers as well as the sweep retrace, the 571A[1] display blanking output should be used. Refer to Details A and B of Figure 3.3.

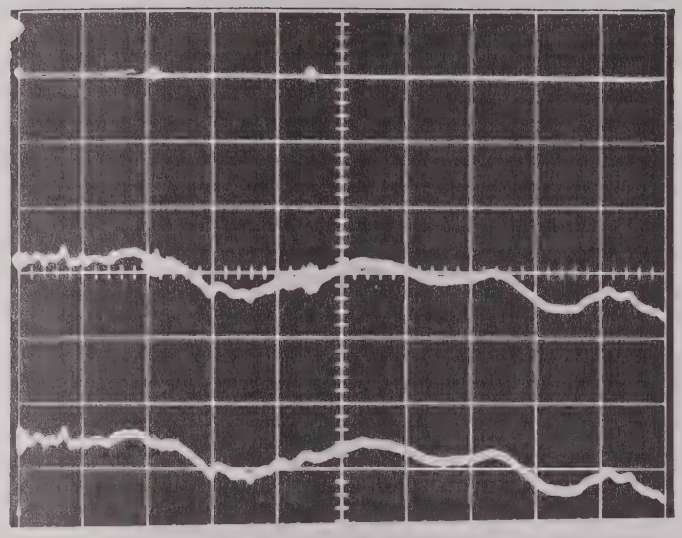
3.3.7 Detectors. For best measurement accuracy, crystal detectors or power meters used in band 1 test setups should be rated for use down to 200 kHz, or an external low-pass filter should be used on the output of microwave crystal detectors. Otherwise, RF leak-through (as shown in Details C and D of Figure 3.3) will obscure the detected output.

Some crystal detectors suitable for use at the low-frequency end of band 1 include Systron-Donner Model 305 (100 kHz to 2 GHz), Wiltron Model 73 (100 kHz to 4 GHz), and Hewlett-Packard Model 8471A (100 kHz to 1.2 GHz).

3.3.8 Retrace Transients. It is normal for some 571A[1] RF plug-ins to exhibit two short transients or "glitches" on the displayed retrace line, as shown in Detail B of Figure 3.3. These transients are actually momentary reductions in RF attenuation just below the band crossover frequencies. The amplitude of the transients will vary as a function of output capacity of the detecting device used, but in any case they will never occur during forward sweep or cause measurement disturbances.

3.3.9 Power Meter Measurements. If an RF power meter is being used to measure output power of the plug-in at high sweep speeds, it will indicate average power over the swept band provided the sweep retrace is not blanked. Setting the 540[2] RETRACE switch to OFF will blank the RF output during sweep retrace and cause the power meter to indicate a lower power amplitude than is actually present. The fast rising and falling voltages of the beginning and end of sweep retrace will also cause disturbances when logarithmic converters or crystal-detector type logarithmic power meters are used, causing abnormal power levels to be indicated at fast sweep speeds.

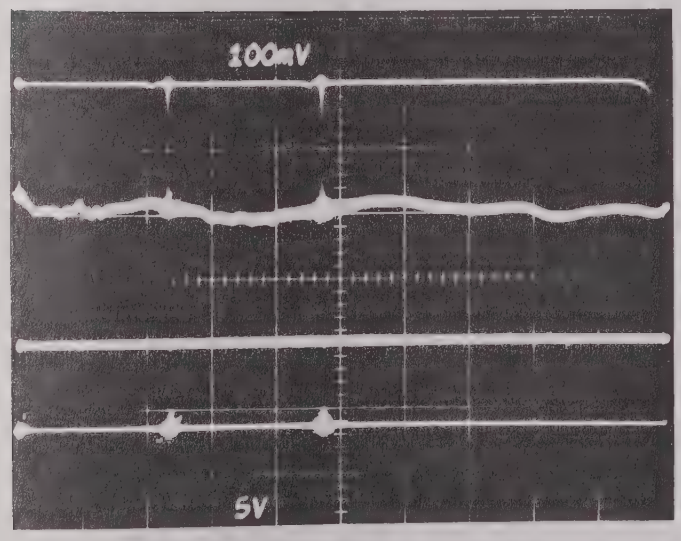
[1] Or 571B
[2] Or 540A, 540B



DETAIL A

Typical display of detected RF output in continuous sweep band (4), internally leveled, through 6 dB attenuator (0.5 dB/division)

Same display, retrace and band crossover markers blanked

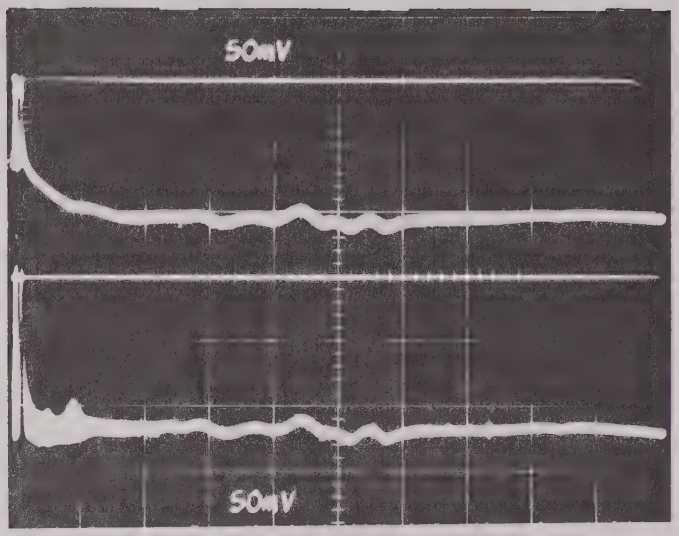


DETAIL B

Continuous sweep band display; note retrace, band crossover markers, and transient on retrace line just after each band switch; the latter are normal in 571A and 571B plug-ins.

Display blanking output from rear panel jack

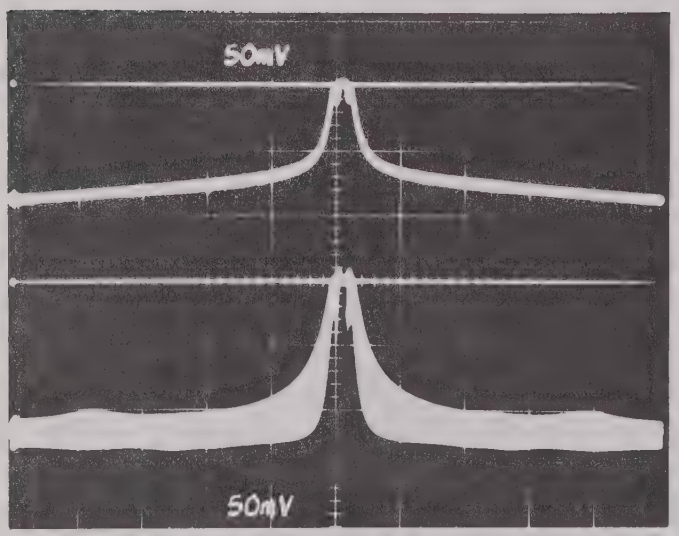
Figure 3.3 Display Details (Sheet 1 of 2)



DETAIL C

Detected display of Band 1 RF output showing local oscillator zero beat at left side of display when low frequency sweep limit is set below 5 MHz

Same as above, also showing RF leak-through when crystal detector with 10 MHz lower limit is used



DETAIL D

Detail of zero beat with sweeper in $F_C \pm \Delta F$ mode, 10 MHz/division horizontal deflection

Same as above with RF leak-through, typical of microwave crystal detectors without low-pass filter

Figure 3.3 Display Details (Sheet 2 of 2)

SECTION 4

THEORY OF OPERATION

4.1 GENERAL

This section has been included to aid the user in understanding the unique or unusual circuitry used in the 571A/571B series of RF plug-ins.

The entire 540[1] system, including RF plug-in, is described in Section 4 of the 540[1] manual; particular attention should be given to system block diagram Figure 4.1 in the 540[1] manual, which shows the interconnections between the various systems of the sweeper mainframe and the RF plug-in.

Figure 4.1 of this manual section shows the interrelationships of the RF components and control circuits in the plug-in.

4.2 RF CIRCUITS

The following circuit descriptions are based upon block diagram Figure 4.1; the components referred to are shown in Figure 1.1. All descriptions are based on the assumption that the 540[1] mainframe F1-START control has been set to its lowest frequency (maximum counterclockwise) position, that the F2-STOP control has been set to its highest frequency (maximum clockwise) position, and that the F1-F2 SWEEP MODE switch has been depressed. The power levels shown on the diagram are approximate leveled mode maximums.

4.2.1 Band 1 Operation. Oscillator Y2 is enabled in band 1 and band 2 modes; its RF output is fed through directional coupler DC1 to RF bandswitch S1. In band 1, the oscillator is swept from 2.2 to 1.2 GHz.

The main line output of the directional coupler is terminated in 50 Ω within the body of the bandswitch. The coupled output, at a level of about 0 dBm (1 mW), is fed to mixer MT1, where it is mixed with the output of band 1 local oscillator Y1. The local oscillator operates at a fixed frequency of 2.2 GHz. The four components of the mixer output are:

- 2.2 GHz from Y1
- 2.2 to 1.2 GHz from DC1
- The sum, 4.4 to 3.4 GHz
- The difference, 0 to 1 GHz

[1] Or 540A, 540B

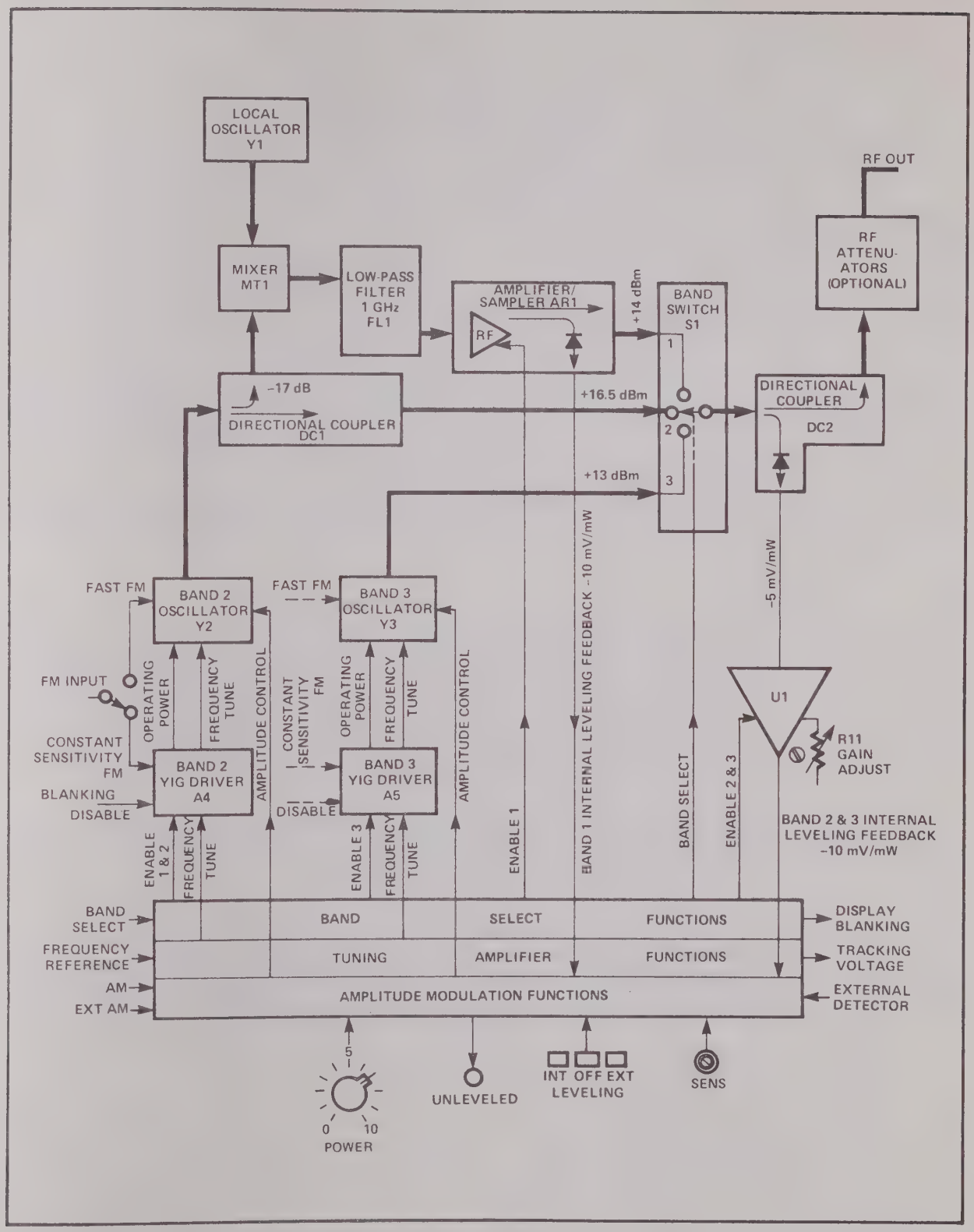


Figure 4.1 571A/571B Block Diagram

Passing the mixer output through 1 GHz low-pass filter FL1 removes all components but the desired 0 to 1 GHz difference. An RF amplifier with built-in directional detector, biased "on" only in band 1 mode, increases the signal amplitude to approximately +14 dBm (25 mW). The amplifier's bandwidth is limited to 1 GHz, further reducing any higher frequency components which may have passed through the filter. The directional detector output is -10 mV for each milliwatt of output power; this voltage is fed to the amplitude modulation circuits to be used as internal leveling feedback.

Bandswitch S1 is biased to allow passage only of the energy from AR1; although the 2.2 to 1.2 GHz input from DC1 is also connected to the bandswitch, isolation between the band 1 and band 2 inputs exceeds 40 dB. Isolation between the band 1 and band 3 inputs is only about 17 dB, but there is no input from the band 3 oscillator in band 1 mode.

Directional coupler DC2 is used only as a coaxial line section in the band 1 mode of operation; its detector output is not used (amplifier U1 is disabled). The output of DC2 is fed directly or through optional attenuators to the front panel RF OUT connector.

4.2.2 Band 2 Operation. The 980 to 2020 MHz (2200 MHz in Model 571A-2) output of oscillator Y2 is fed through the main line of directional coupler DC1 and bandswitch S1 to directional coupler DC2. In band 2 mode, the band 3 and band 1 inputs to the RF switch are disabled. Although local oscillator Y1 operates at all times, its output through the mixer does not pass through the disabled band 1 amplifier. The detected output from the coupled arm of DC2, at -5 mV/mW of main line power, is doubled in amplitude by operational amplifier U1 and fed to the AM circuits as internal leveling feedback. As in band 1, the output of DC2 is fed directly or through optional attenuators to the RF OUT connector.

4.2.3 Band 3 Operation (571A-1/571B). The 1900 to 4200 MHz output of band 3 oscillator Y3 is fed through band switch S1 and directional coupler DC2 to the output. As Y2, the band 1/band 2 oscillator, and AR1, the band 1 amplifier, are both disabled in band 3 mode, there are no other inputs to the band switch which could cause spurious outputs.

Internal leveling feedback in band 3 is processed through DC2 and U1 as in band 2.

4.2.4 Band 4 Operation. Coverage of the entire frequency range of the plug-in, from below 5 MHz to 4.2 GHz in a single sweep, is accomplished by consecutively activating and sweeping the band 1, band 2, and band 3 ranges as previously described. The signal flow in band 4 is identical to that described for the individual bands, but oscillators Y2 and Y3 and amplifier/sampler AR1 are disabled while band switch S1 is changing bands. These devices are also disabled during sweep retrace to effect the highest on/off ratio.

Subsequent descriptions of the band select, tuning amplifier, and amplitude modulation circuits detail closely the manner in which this continuous sweep mode of operation is managed.

4.3 TUNING AMPLIFIER FUNCTIONS

4.3.1 General. The tuning amplifier circuits on mother board A2 condition and modify the frequency reference signal from the 540[1] mainframe as required to feed the two YIG driver boards such oscillator tuning voltages as are commensurate with the frequency band selected. The output of the mainframe is a 0 to -10 V ramp.

These circuits also provide band crossover information (in continuous sweep mode) to the band select circuits and a rear-panel tracking voltage output proportional to output frequency.

4.3.2 Single-Band Operation. When band 1, 2, or 3 has been selected, relays K1, K2, and K3 will be deactivated as shown in Block Diagram Figure 4.2.

BAND 1. The frequency reference voltage from the mainframe is coupled through the normally-closed contacts of relay K2 to the input of band 1 range amplifier U12. Because a "1" from the band select circuits has opened disable switch Q6, U12 operates, inverting the sweep ramp (or steady-state tuning voltage) from the 540[1] mainframe before it reaches the band 1/band 2 YIG driver. When band 1 is selected, the band 2 oscillator is tuned down-frequency to yield an up-frequency beat output (refer to Paragraph 4.2). The operating characteristics of amplifier U12 are adjusted by two calibration potentiometers to complement the calibration of the band 2 oscillator and YIG driver.

The output of U12 is coupled through an isolating diode to the input of band 2 YIG driver A4 (refer to Paragraph 4.4). There is no tuning output from U8, since it has been disabled by switch Q5.

BAND 2. When band 2 is selected, switch Q5 is turned off by a "1" from the band select circuits, thus enabling amplifier U8. At the same time, switch Q6 disables amplifier U12. Consequently, the drive signal to band 2 YIG driver A4 is derived by coupling the frequency reference signal from the 540 mainframe through the normally-closed contacts of relay K3, amplifier U7, inverter U8, and an isolation diode.

Unlike band 1, band 2 is not a beat-frequency band, so inverter U8 is used to restore the original frequency reference signal polarity after processing by amplifier U7.

BAND 3. When band 3 operation is desired (571A-1 or 571B plug-ins), the band select circuits provide "0" levels to disabling switches Q5 and Q6; band 1 range amplifier U12 and band 2 range amplifier inverter U8 are both disabled.

The frequency reference input from the mainframe is coupled directly through the normally-closed contacts of relay K1 to band 3 YIG driver A5.

[1] Or 540A, 540B

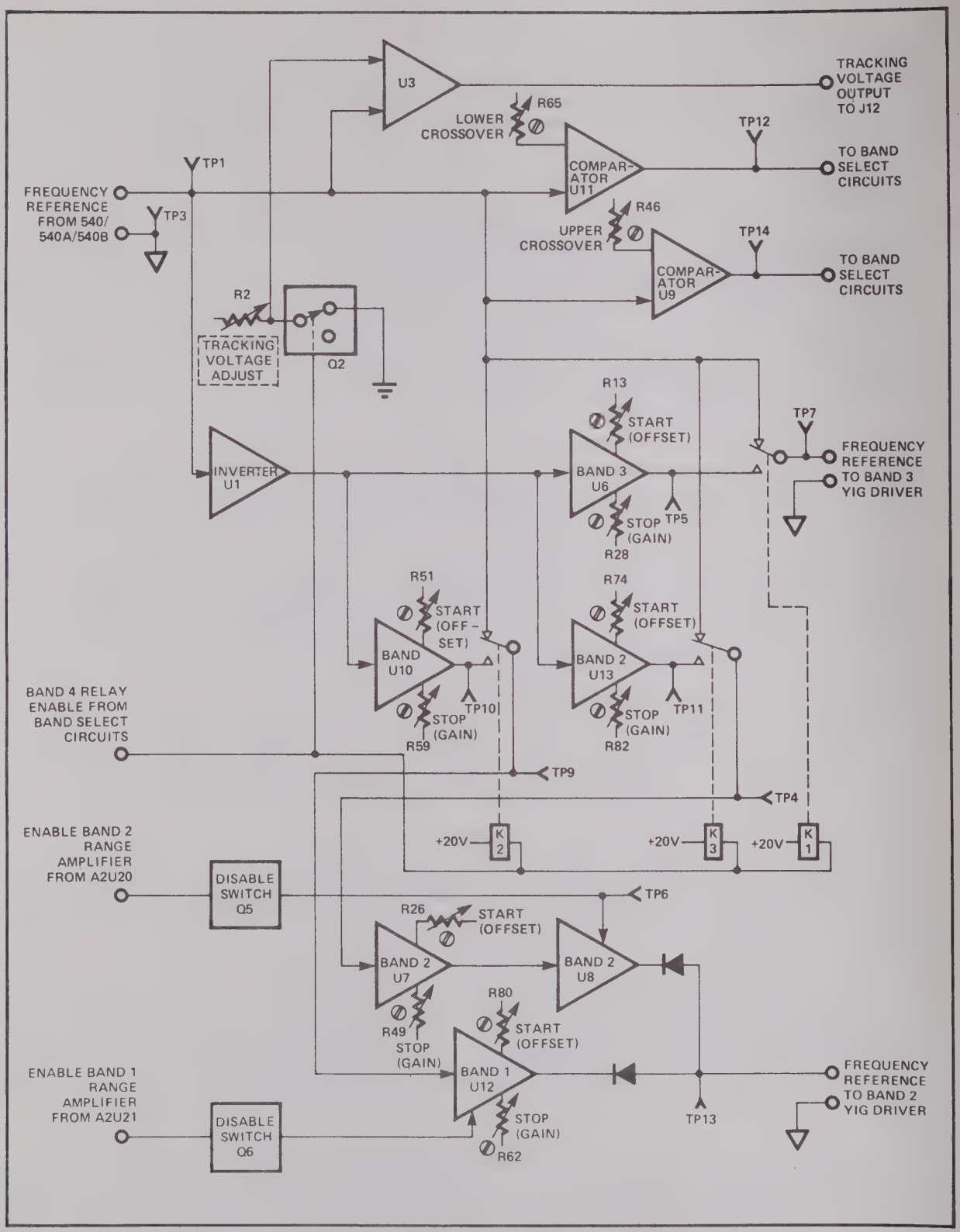


Figure 4.2 Tuning Amplifier Functions Block Diagram

4.3.3 Continuous Band Operation. When the mainframe BAND SELECT switch is set to band 4, the frequency reference signal from the mainframe is modified by the tuning circuits so that each oscillator will be driven over its entire range by a portion of the sweep ramp. Assume that the F1-START control is set to its maximum counterclockwise position, that the F2-STOP control is set to its maximum clockwise position, and that the sweeper is operating in its F1-F2 sweep mode.

SWEEP COMPARATORS. Comparators U9 and U11 sense the level of the frequency reference signal and provide a high output to the band select circuits at preselected points. At an input level of approximately -2.5 V on the sweep ramp (the crossover between bands 1 and 2 at 1 GHz), the output of Q11 goes high; Q9 goes high when the sweep ramp reaches approximately -5 V, corresponding to the 2 GHz crossover between bands 2 and 3. These comparator outputs are decoded in the band select circuits to open disabling switches Q5 and Q6 at the appropriate times.

Model 571A-2 plug-ins, which do not contain the band 3 oscillator or YIG driver, have slightly modified tuning amplifier circuits and are factory-calibrated to disable the upper crossover comparator. The lower crossover comparator changes state at about -5 V on the frequency reference sweep ramp, and -10 V corresponds to approximately 2200 MHz.

SWEEP RAMP INVERTER. Unity-gain amplifier U1 inverts the 0 to -10 V frequency reference ramp signal so that the inverted outputs of U10, U13, and U6 will be of the same polarity as the input. U1 also provides isolation between the frequency reference input and the continuous sweep tuning amplifiers.

BAND 1. During the band 1 portion of the sweep ramp, between 0 and approximately -2.5 V, amplifier U10 generates a 0 to -10 V output which is coupled through relay K2 to band 1 range amplifier U12. Amplifier U12, enabled by opening Q6, performs as it did in single-band operation, feeding an inverted sweep ramp through the isolation diode to band 1/band 2 YIG driver A4.

BAND 2. When the lower crossover comparator changes its output state at the frequency reference voltage corresponding to about 1 GHz, the band select circuits will turn on Q6 and turn off Q5, thus disabling band 1 range amplifier U12 and enabling band 2 range amplifier inverter U8.

The incoming sweep ramp is amplified and inverted by U13 and coupled through relay K3 to the input of range amplifier U7. As in single band operation, this amplifier has been calibrated to precondition the frequency reference signal to match the characteristics of the YIG driver and oscillator. Inverter U8 restores the frequency reference to its original polarity.

BAND 3. In 571A-1 and 571B plug-ins, upper crossover comparator U9 changes state at the point on the sweep ramp corresponding to 2 GHz, about -5 V. Switches Q5 and Q6 disable the band 1 and band 2 range amplifiers.

The inverted frequency reference signal from U1 is amplified and inverted back to its original polarity by band 3 continuous sweep tuning amplifier U6, then coupled through relay K1 to band 3 YIG driver A5.

SWEEP TIMING RELATIONSHIPS. The relationships between the outputs of the continuous sweep range amplifiers and the 0 to +10 V sweep output of the 540[1] mainframe are shown in the last oscillogram of Figure 5.3; the sweep ramp used as a reference is fixed in peak-to-peak amplitude and is of the opposite polarity from the frequency reference input to the tuning circuits.

Each positive-going portion of the sweep ramp corresponds to a negative-going 0 to -10 V sweep ramp for bands 1, 2, and 3. Amplifiers U10, U13, and U16 saturate at about +1 and -11 V, limiting the output excursions for input levels beyond the normal tuning range of each amplifier.

The two horizontal areas on the sweep ramp trace shown in the oscillogram are band crossover points where the sweep ramp is stopped and held while all switching transitions occur.

4.3.4 Tracking Voltage Output. Amplifier U3 samples the frequency reference input to the tuning circuits and generates an output voltage proportional to frequency through the rear-panel TRACKING VOLTAGE connector. In the single-band operating mode, this output is limited to a maximum of +5 V as the amplifier's positive input is referenced to ground through transistor switch Q2. In continuous sweep mode, switch Q2 is opened and the maximum output level is set (to a maximum of +15 V) by rear-panel TRACKING VOLTAGE ADJUST potentiometer R2.

4.4 YIG DRIVERS

4.4.1 General. Both tunable oscillators in the plug-in are YIG-tuned transistor types with integral modulators and dual tuning coils. In this type of oscillator, a microwave transistor is the active element and a sphere of yttrium-iron-garnet material acts as a resonant tank circuit for the transistor and as a coupling device for the RF output energy.

Magnetic flux lines generated by the tuning electro-magnet coil(s) align the poles of the YIG sphere, causing it to act as a classical resonant circuit; once the material has been magnetically saturated, it can be tuned to various frequencies at a constant rate of some 2.8 MHz per Gauss (one Maxwell per square centimeter). This uniform precessional mode, as it is known, is defined as the condition in which the magnetic moments of all atoms in the YIG crystal are parallel and precess in phase about the uniform magnetic field.

These YIG-tuned oscillators are inherently linear, but require operating and tuning drive currents as high as 1 A. The plug-in YIG driver boards are used to provide operating power to the oscillator and to convert the frequency reference voltage from the plug-in tuning amplifier circuits into current drive for the main tuning coil in the oscillator. The YIG driver also contains protective circuitry for the oscillator element and tuning circuits.

[1]Or 540A, 540B

Refer to YIG driver block diagram Figure 4.3 and the schematic diagram of the YIG driver board in Section 6.

4.4.2 Operating Power. A constant voltage power supply comprising operational amplifier U5 and pass transistor Q5 provides operating bias voltage (V_B) for the transistor oscillator element in the oscillator module. The required bias level is determined by the characteristics of the oscillator used; a voltage divider comprising resistors R38 and R31 is selected to set the feedback level from the load (oscillator). This level is compared to a fixed reference level in U5, which develops base drive for Q5 to maintain the optimum bias level for operation of the oscillator.

OVERVOLTAGE PROTECTION. A constant voltage power supply of the type used here will tend to increase its output voltage in response to increasing current demands in order to maintain a steady voltage at the sensing point, in this case the oscillator module.

An over-voltage clamp (crowbar) circuit containing Zener diode VR3 and SCR (silicon-controlled rectifier) CR7 is used to protect the oscillator from transient voltages or overloads which could destroy it.

If the bias voltage is allowed to rise above the Zener level of diode VR3, two protective devices will be used: VR3 will clamp the bias to +22 VDC, dissipating the overload in resistor R35. In addition, SCR CR7 will trigger and short-circuit the base drive of regulator pass transistor Q5 to ground. The output of regulator driver U5 is dissipated internally. Once CR7 has triggered, it will continue to short-circuit the output of U5 to ground until all power has been removed.

REVERSE POLARITY PROTECTION. Diode CR10 provides reverse polarity protection for the oscillator; negative voltages will be short-circuited directly to ground through CR10.

4.4.3 Bias Switching. In order to enable oscillator operation, a "1" logic level ($\approx$+5 V) from the band select circuits is applied to transistor switch Q4. When this level is a "0", +20 V is applied through resistor R33 and diode CR6 to regulator U5, placing a high level on the bias sense line, thus reducing the bias level to < 1 V. The transistor oscillator element will not operate at this bias level, but the idling current through the transistor will keep it close to operating temperature.

The oscillator can be turned off even while the enabling level is applied by coupling a negative blanking signal to Q4. This has the effect of turning off Q4, allowing the +20 V level to be coupled to U5 and reduce its output.

4.4.4 Tuning Circuits. The frequency reference output of the tuning amplifier circuits (Paragraph 4.3) is differentially coupled to operational amplifier U1 of the YIG driver; this operational amplifier operates with a gain of -1. A 10:1 voltage divider network is used

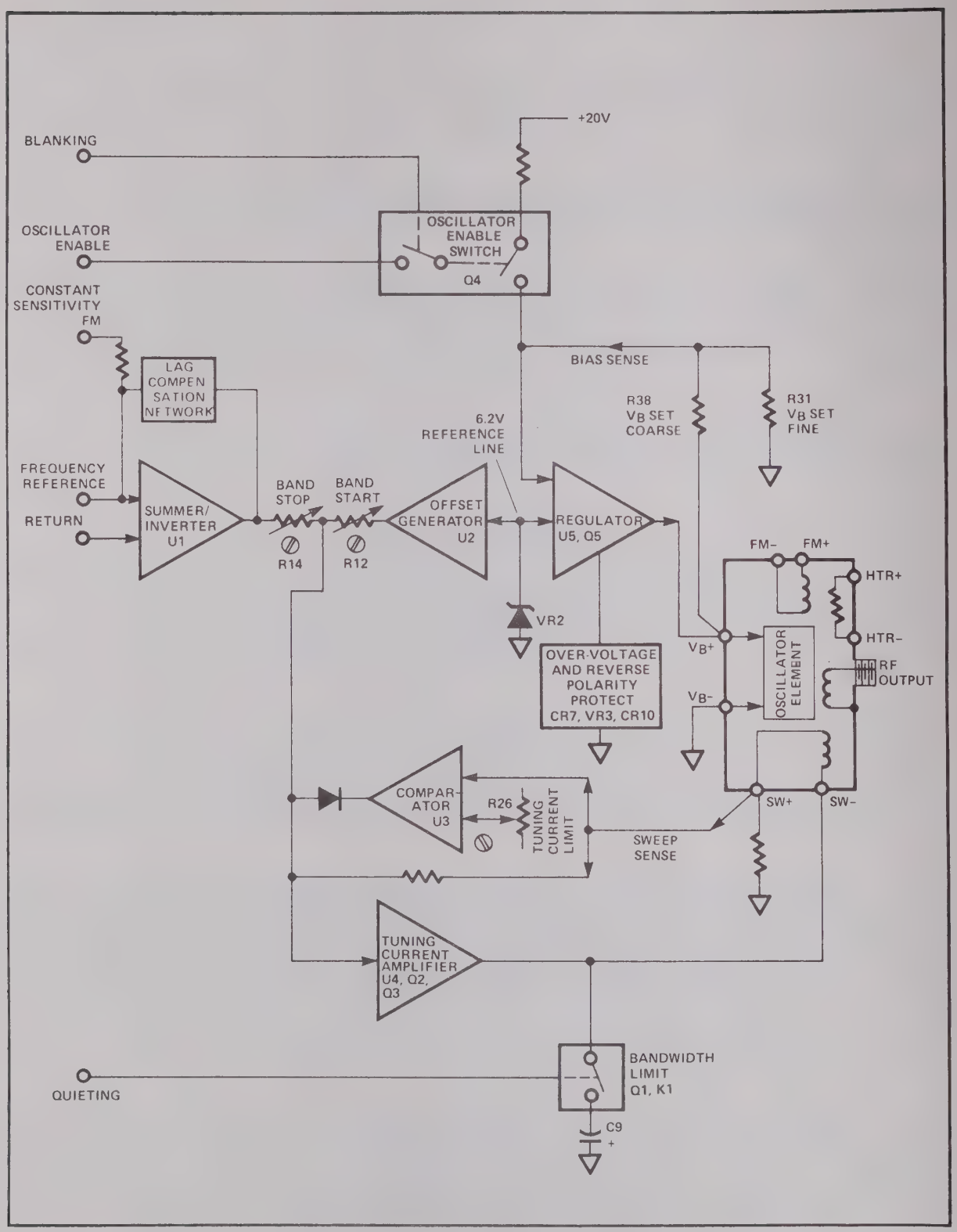


Figure 4.3 YIG Driver Block Diagram

between the constant sensitivity FM input to the YIG driver board and the summing point of U1. Finally, a lag compensation network in the feedback loop around U1 compensates for the lag inherent in the inductance of the oscillator tuning coil.

The same 6.2 V reference line used by the constant-voltage bias supply is used as a signal input to amplifier U2, which offsets it to approximately 12.4 VDC.

TUNING AMPLIFIER. Operational amplifier U4 and transistors Q2 and Q3 form a voltage to current amplifier which drives the main tuning coil in the YIG-tuned oscillator. The amplifier is capable of delivering up to 1 A, and operates in a closed loop as the voltage developed across the tuning sense resistor is returned to U4 through the feedback resistors.

The current through the tuning coil (and consequently the operating frequency of the oscillator) is determined by the algebraic sum of the current values through the band stop resistors, the band start resistors, and the feedback resistors.

TUNING CURRENT LIMIT. If the tuning current exceeds a predetermined limit set by variable resistor R26, comparator U3 will change state and hold the tuning current amplitude to its maximum allowable value. This action prevents the oscillator from being driven beyond its normal operating band by transients or excessive external FM input levels. On such occasions as this oscillator lock-up might occur, the circuitry may be reset by turning off the 540[1] power switch, waiting a few seconds, then turning the power back on.

QUIETING. When the sweeper is operated in a non-swept mode -- CW or manual scan -- a quieting input from the 540[1] activates transistor relay driver Q1 and relay K1 to place capacitor C9 across the output of tuning current amplifier U4/Q2/Q3. This reduces the tuning bandwidth of the amplifier to less than 10 Hz, reducing incidental noise and residual FM in the RF output.

4.4.5 External Tuning Inputs. In addition to the tuning input from the tuning amplifier circuits, a choice of constant sensitivity or wide-band FM inputs is available. The constant sensitivity input was described in Paragraph 4.4.4; when the rear-panel FM switch is set to FAST, the FM input is connected directly to a second tuning coil in the oscillator. The sensitivity of this input is typically 250 kHz/mA as opposed to 10 MHz/V for the constant sensitivity input. Only one of these external FM'ing methods may be used at one time.

4.5 BAND SELECT FUNCTIONS

4.5.1 General. RF plug-in operating band selection is controlled by the 540[1] mainframe BAND SELECT switch, which is mechanically linked to the dial drum. Rotation of the BAND SELECT knob causes the appropriate portion of the dial drum to come into view and simultaneously provides an electrical band select command to the plug-in.

[1] Or 540A, 540B

Input signals to the band select circuits include:

- Contact closure to ground from the 540[1] for band selection
- Slow sweep reference from the 540[1]
- Blanking (sweep retrace) reference from the 540[1]
- Band crossover inputs from the tuning amplifier circuits, used in continuous sweep mode (band 4)

Output signals from the band select circuits include:

- RF bandswitch drives
- Enabling signals to amplifier/sampler A1AR1 in band 1 mode
- Sampler select signals to the AM circuits for internal leveling
- Switch drives to connect amplitude control outputs to the appropriate oscillator
- Oscillator enabling signals to the YIG drivers
- Range amplifier enabling signals to the tuning circuits
- Relay enabling command to the tuning circuits to switch from single-band to continuous sweep mode of operation
- Off command to AM circuits
- Display blanking to rear-panel connector J11
- Sweep stop command to 540[1] sweep circuits

The descriptions of band select circuitry which follow are based upon logic/block diagram Figure 4.4.

4.5.2 Single Band Operation. When any of the single bands -- 1, 2, or 3 (571A-1/571B) -- has been selected, the band 4 select line is high, at logic "1" level. The band 4 select line is shown on the logic/block diagram running between diode CR1 and gate U21B. This provides a "1" to one input of each upper AND gate in U20A, U20B, and U21A. This "1" is inverted by U14F to provide a "0" to each lower AND gate in U20A, U20B, and U21A.

The "0" from U14F also disables multivibrators U15 and U16, because the sweep stop, AM off, and display blanking functions are not used in single band mode.

BAND 1. Refer to gate U21A on the diagram; when band 1 is selected, the inputs to the upper AND gate are "0" and "1", so its output is "0". The inputs to the lower AND gate are "0" (from U14F) and "0" or "1" from U14D. In either case, the output of the lower AND gate is "0"; with two "0" inputs, the NOR gate output is "1", and band 1 is selected:

[1] Or 540A, 540B

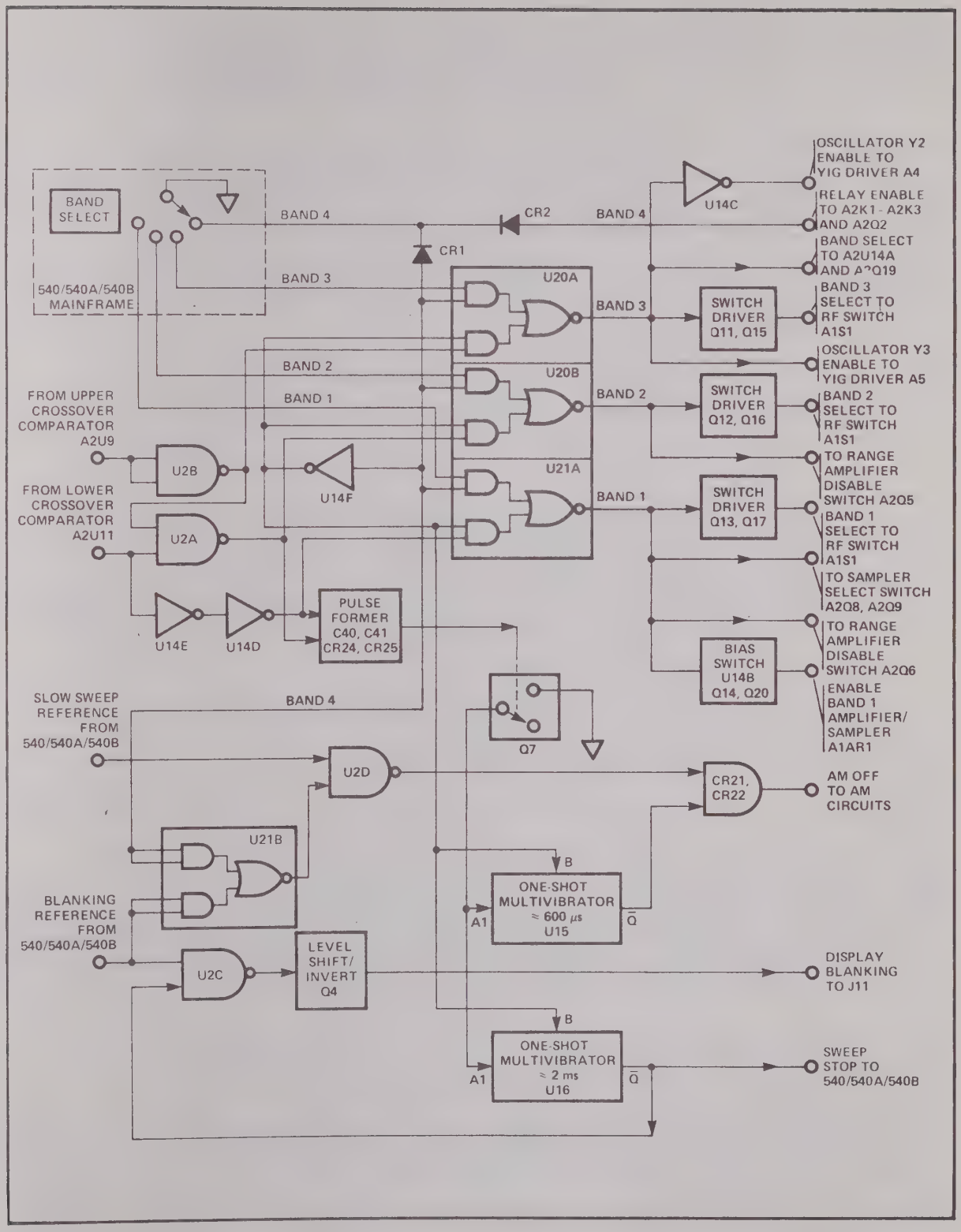


Figure 4.4 Band Select Logic Block Diagram

- Bias switch U14B/Q14/Q20 supplies operating power for RF amplifier/ sampler A1AR1 on the RF board (refer to Paragraph 4.2).

- The "0" output of band 3 selector U20A is inverted by U14C, enabling band 1/band 2 YIG driver A4

- Switch driver Q13/Q17 provides a constant current of approximately 4 mA through one of the PIN diodes in RF switch A1S1 to allow passage of only the band 1 RF signal through to the output

- The "1" level enables band 1 range amplifier A2U12 in the tuning amplifier circuits by turning off disable switch A2Q6

- The "1" level enables the output of band 1 detector amplifier U17 in the AM circuits; transistor switch Q9 is turned on, turning switch Q8 off and removing a short circuit to ground from the U17 output (see Figure 4.5)

- The "0" from U20A drives AM switch A2Q18, allowing the passage of amplitude control signals from A2U19/A2Q10 to band 1/band 2 oscillator Y2. Inverter U14A drives AM switch A2Q19 to disable band 3 AM functions.

BAND 2. Selecting band 2 causes the output of U20B to go to "1", while the band 1 output of U21A and the band 2 output of U20A are at "0":

- The "1" level from U14C continues to enable YIG driver A4

- Switch driver Q12/Q16 provides a 4 mA current to allow band 2 energy to pass through RF switch A1S1

- The "1" level opens switch A2Q5 to enable band 2 range amplifier A2U8

- The "0" level from U21A disables the output of amplifier A2U17, allowing only the output of A2U18 to pass to the amplitude modulator summing point

- The "0" level from U20A controls AM switches A2Q18 and A2Q19

BAND 3. The output of U20A goes to "1" when band 3 is selected:

- The "1" level is fed to YIG driver A5, enabling band 3 oscillator Y3; U14C inverts this to "0", thus disabling band 1/band 2 oscillator Y2

- Switch driver Q11/Q15 causes RF switch A1S1 to select band 3

- The "0" levels at A2Q5 and A2Q6 disable band 2 range amplifier A2U12 and band 1 range amplifier inverter A2U8.

- The "1" level causes AM switch A2Q18 to disable band 1/band 2 control functions while the inverted output of U14A drives switch A2Q19 to pass amplitude control signals to band 3 oscillator Y3.

4.5.3 Continuous (Band 4) Operation. When the bands are to be scanned consecutively during a single sweep cycle, the band 4 select line goes to "0" and the output of U14F goes to "1". The determination of which band is selected will depend upon the output states of band decoders U2A and U2B driven by the crossover comparators in the tuning amplifier circuits. In single band mode, band switch logic input states (reading from top to bottom as drawn in Figure 4.4) of 0-1-0-1 or 0-1-0-0 were required to yield a "1" output from the NOR gate. In continuous sweep mode, input states of 1-0-1-0 are needed.

BAND SELECTION. At the beginning of sweep, the outputs of both comparators are "0". This condition yields a "1" at the output of U2B and a "1" at the output of U2A; only band 1 gate U21A will have a "1" output. When lower crossover comparator A2U9 changes its output state to "1", only band 2 gate will have a "1" output. Band 3 is selected when both crossover comparators have changed to "1" outputs.

SWEEP STOP. Band switching in continuous sweep mode is performed while the frequency-determining sweep ramp is stopped and held; this prevents switching transients from appearing in the RF output and ensures that there are no "dead" spots or missing bands of frequencies.

Each change of state in the crossover comparators is detected and differentiated by the pulse former, which triggers switch Q7; this transistor, in turn, triggers one-shot multivibrator U16. The $\overline{Q}$ output goes to "0", stopping the upward progress of the sweep ramp in the 540[1] sweep circuits. After 2 ms, U16 times out and the sweep ramp resumes its progress.

DISPLAY BLANKING. A -6 V level is available at the rear panel DISPLAY BLANKING connector to blank or disable external CRT displays or chart recorders during band crossover transitions and sweep retrace.

Multivibrator U16 provides a 2-ms "0" to one input of NAND gate U2C at each band crossover; the other input to U2C at this time is a "1", so the output of U2C is a "1"; this is inverted and shifted somewhat by transistor Q4. During sweep retrace, the blanking reference from the 540[1] is "0" and the input from U16 is a "1", yielding a -6 V blanking output from Q4.

AM OFF. The RF output levels of the oscillators are attenuated during band crossovers by coupling an AM off pulse to the AM circuits. One-shot multivibrator U15, triggered at transition points by Q7, feeds a 600 μs-wide pulse through diode CR22 from its $\overline{Q}$ output. After the multivibrator has timed out, the AM circuits are again enabled. However, the sweep is still stopped; this allows sufficient time for the output levels to settle before the sweep is started some 1.4 ms later.

[1]Or 540A, 540B

The blanking reference is also used to reduce the oscillator amplitude during sweep retrace; gate U21B receives four "0" inputs during sweep retrace in band 4. Its output to NAND gate U2D is a "1". If the slow sweep reference from the 540[1] is not present, U2D couples an AM off pulse through diode CR21 to the AM circuits.

This is not desirable when chart recorders are used because of their inability to respond to the fast-rising pulses which would result during sweep retrace. Consequently, the retrace AM blanking is disabled whenever the 540[1] SLOW SWEEP switch is depressed.

4.6 AMPLITUDE CONTROL FUNCTIONS

4.6.1 Modulators. Oscillator modules Y2 and Y3 contain internal shunt PIN diode modulators to control their RF output amplitudes. Maximum attenuation of the RF output amplitude is achieved with an external control input of +5 VDC; the output amplitude of the oscillator will be attenuated by at least 40 dB from its maximum output level. An input level of 0 V allows the oscillator to deliver maximum output power.

4.6.2 Control Voltage Generators. Amplitude modulation circuits on mother board A2 generate drive for the PIN-diode modulators; inverting summing amplifier U19 and current amplifier Q10 provide modulator drive to the oscillator when allowed by switch Q18 (band 1 and band 2) or switch Q19 (band 3). Refer to block diagram Figure 4.5.

4.6.3 Operating Modes. Three modes of operation are available, as set by the front-panel LEVELING switches: leveling off, internal leveling, and external leveling. A generally undesired fourth mode can occur if the leveling feedback loop is broken, usually by selection of the external leveling mode when no external leveling devices are connected.

LEVELING OFF MODE. The simplest amplitude control configuration exists when the LEVELING OFF switch is depressed, as shown in Figure 4.5. Up to four amplitude control signals are summed into the current summing junction of U19:

- Output power control from front-panel POWER potentiometer R3
- 1-kHz square-wave modulation or an RF off DC level from the 540[1] mainframe
- External amplitude modulation signals coupled through the 540[1] mainframe
- An AM off pulse from the plug-in band select circuits to disable the amplitude control functions during band crossover transitions in continuous sweep mode (refer to Paragraph 4.5.3)

The output of amplifier U18 is also connected to the summing junction in leveling off mode, but the input to U18 is disconnected by leveling switch S1A.

[1] Or 540A, 540B

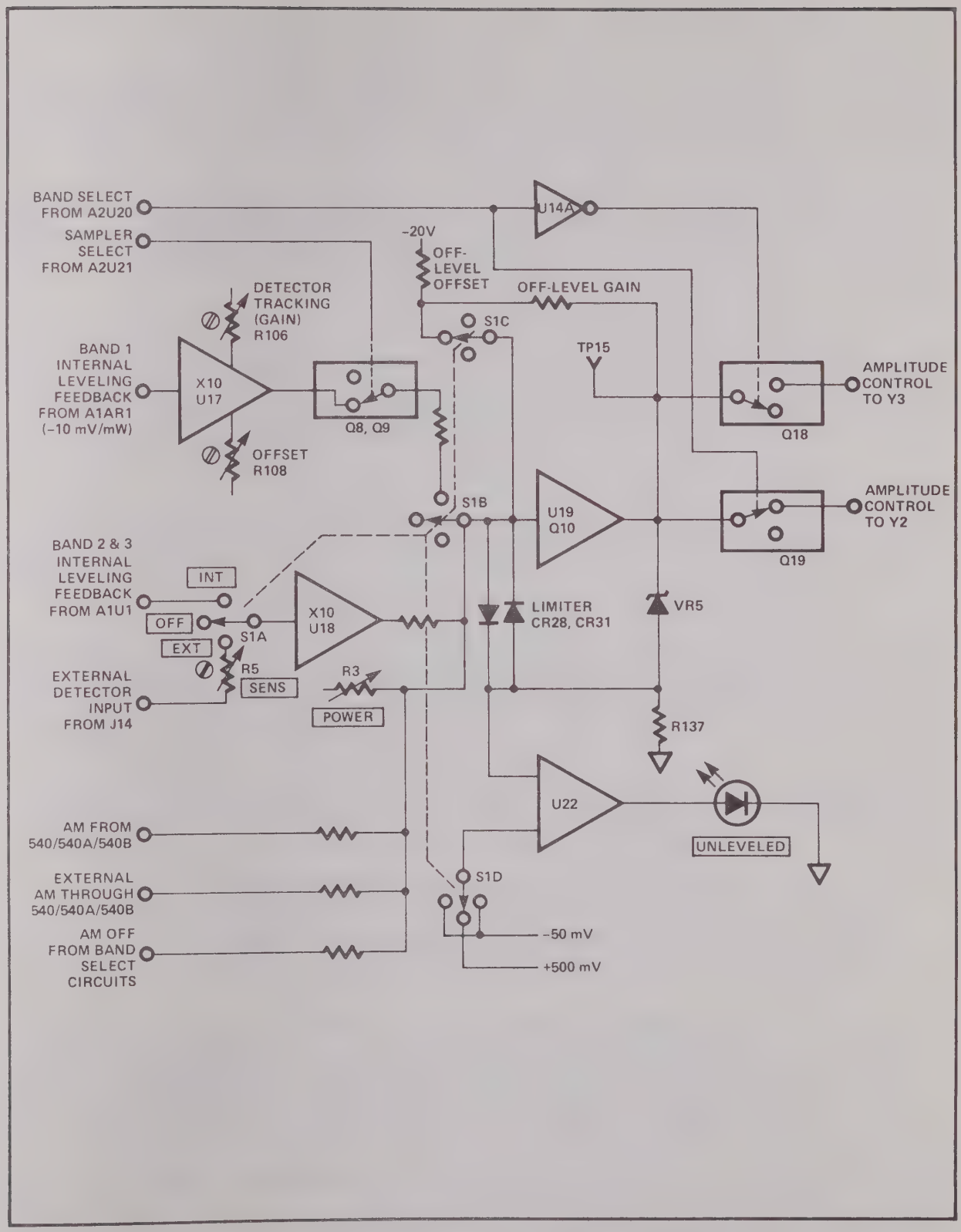


Figure 4.5 Amplitude Control Functions Block Diagram

In the leveling off mode, voltage gain and DC offset of U19/Q10 are set by factory-selected resistor networks connected across the amplifier through switch section S1C.

Input and output limiters comprising diodes CR28, CR31, and VR5 prevent the modulator drive from exceeding -1 V in the negative direction or +5.6 V in the positive direction, assuring oscillator control from fully on to fully off without overdriving the PIN diodes.

INTERNAL LEVELING MODE. When the INT switch is depressed, the internal feedback around U19/Q10 is disconnected by S1C and replaced by feedback through the entire internal leveling loop.

When band 1 is used, the output of amplifier/sampler A1AR1 at -10 mV/mW of oscillator output power is amplified by decade amplifier U17 and coupled through switch section S1B to the summing junction of U19.

In all bands except band 1, transistor switch Q8/Q9 prevents interaction between A1AR1, the 0 to 1 GHz sampler, and the preamplified output of 1 to 4.2 GHz sampler A1DC2 by short-circuiting the output of U17 to ground.

When band 2 or 3 is in use, the output of leveling preamplifier A1U1 on the RF assembly board is coupled through switch section S1A to decade amplifier U18, then applied to the summing junction of U19.

EXTERNAL LEVELING MODE. When the EXT switch is depressed, decade amplifier U18 is driven by the negative output of an external directional coupler/crystal detector combination. Front-panel SENS. control R5 is set by the operator to match the characteristics of the external directional detector to the 571A. Sufficient control range is available to allow the use of 10 to 16 dB couplers for power control over the full operating range of the RF plug-in.

If the external leveling mode has been selected, but the proper negative feedback signal is not fed to U18, the POWER control and other inputs to the summing junction of U19 will not be able to control the oscillator output amplitudes beyond simple on/off functions.

4.6.4 UNLEVELED Indicator. A front-panel UNLEVELED indicator is used to alert the operator when the flatness of the RF plug-in output signal is not within the specified range.

LEVELING OFF MODE. When the OFF switch is depressed, switch section S1D connects a bias level of approximately +500 mV to comparator U22. This is sufficient to cause U22 to saturate and light the LED front-panel UNLEVELED indicator.

INTERNAL AND EXTERNAL LEVELING MODES. If the POWER control is set high enough that the leveling loop is operating above the maximum unleveled power range, or if for some other reason the feedback voltage is too low, amplifier U19/Q10 will saturate, causing current to flow through diodes CR31 and VR5, developing a voltage across resistor R137. When this voltage exceeds +50 mV, U22 will change state and turn the UNLEVELED indicator on.

4.7 POWER SUPPLIES

Current requirements of the plug-in for +15 V and -15 V power exceed the 50 mA available from the 540[1] mainframe. A pair of on-board regulators powered by the high-current + and - 20 V power supplies provides + and - 15 V operating power for the plug-in. Refer to simplified schematic diagram Figure 4.6.

4.7.1 +15 Volt Supply. Error amplifier U4 develops base drive for pass transistor Q1 (mounted on the plug-in heat sink) to maintain the +15 V output; the resistance values of the two voltage dividers shown in the diagram are such that both inputs to U4 will be +10 V when the regulator is operating properly.

Resistor R30 and transistor Q3 limit the current capacity of the supply to a maximum of 300 mA; at this current, the voltage drop across 2 Ω resistor R30 will be 600 mV. This 600 mV across the base-emitter junction of Q3 turns the transistor on, causing pass transistor Q1 to be turned off because its base and emitter voltages will be nearly equal.

4.7.2 -15 Volt Supply. Operation of the -15 V supply is similar to that of the +15 V supply, except Zener diode VR1 is used as a level shifter between the error amplifier output and the base of pass transistor Q2.

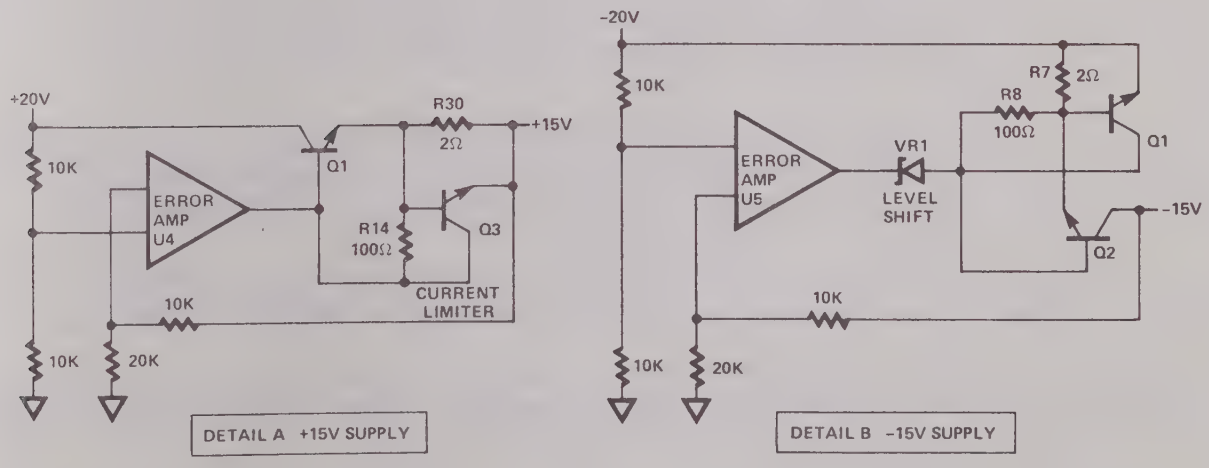


Figure 4.6 Voltage Regulators Simplified Schematic Diagram

[1] Or 540A, 540B

SECTION 5

MAINTENANCE

5.1 GENERAL

This section contains instructions for maintenance of the 571A and 571B series RF plug-ins, including routine maintenance, performance checks for verifying RF plug-in compliance with all applicable performance specifications, calibration procedures for the plug-in, and trouble isolation and repair instructions. Voltage waveforms are located at the end of the section.

All instructions and figures which are listed as applicable to Model 571A-1 also apply to Model 571B; those instructions and illustrations for 571A-2 apply only to that model.

5.2 ROUTINE MAINTENANCE

In normal laboratory environments, the RF plug-in requires only brief annual service. Ideally, the plug-in and the 540 mainframe in which it is used should be serviced together. If no service records are kept, a quick check of the RF plug-in's air filter will indicate when cleaning is necessary. If the air filter, shown as Item 6 of Figure 3.2, has taken on a coating of dust, it will show a light beige or light grey color. Inspect the air filter often, and clean it whenever necessary:

a. Turn off sweeper mainframe power, then disconnect the power cord.

b. Loosen the plug-in locking screw and remove the plug-in from the mainframe.

c. Remove the two Phillips-head screws holding the filter retainer to the rear panel of the plug-in.

d. Remove the foam filtering medium and wash it thoroughly in warm water and detergent. Rinse, shake dry, and allow the foam filter to air-dry completely.

e. While the foam is drying, clean the air channel opening in the plug-in with a brush and low-pressure dry air. Vacuum-clean the area around the cooling fan air inlet hole. A mild detergent solution and a clean rag may also be used.

IMPORTANT

Do not spray the foam filter with filter coating or any other materials; do not apply oils or adhesives to the filter.

f. After the foam material has completely dried, reassemble the filter and filter retainer to the plug-in back panel.

g. If this filter cleaning is part of the annual service routine, proceed with the performance check procedures of Paragraph 5.3.

5.3 PERFORMANCE CHECK

This procedure checks the performance of the RF plug-in to ensure that it is operating within all specified parameters. The procedure should be followed annually, but may be performed at any time.

5.3.1 Equipment Required. The test equipment required to check performance of the plug-in is listed in Table 5.1. All test equipment should bear evidence of recent calibration by a qualified metrology laboratory. Equipment equivalent to that listed in Table 5.1 may be used, but care should be taken to ensure that the rated accuracies of the equipment used is truly equivalent to that cited. In any case, the maximum rated inaccuracy of a piece of test equipment used to measure any parameter must be no greater than one-tenth the maximum inaccuracy which can be tolerated in the measurement.

Table 5.1 Test Equipment for Performance Check

ITEM INDEX	TYPE OF EQUIPMENT	RECOMMENDED MODEL
a	Frequency Counter	
	1 kHz to 4200 MHz minimum (571A-1 and 571B)	Systron-Donner 6016
	1 kHz to 2200 MHz minimum (571A-2)	Systron-Donner 6053 or 6153
b	Spectrum Analyzer, 10 kHz/division resolution, 30 kHz IF bandwidth	
	10 MHz-12.4 GHz (571A-1 and 571B)	Systron-Donner 4809A
	10 MHz-6.5 GHz (571A-2)	Systron-Donner 751B
c	Oscilloscope, high sensitivity with variable bandwidth	Tektronix 544/1A7A or Tektronix 7000-series with time base and 7A22 (or 5000-series with 5A22)
d	RF Power Meter, 10 MHz-4.2 GHz	Systron-Donner 4020A
e	Directional Detector, 10 MHz to 4.2 GHz	Systron-Donner 1025 and 1026
f	Crystal Detector, 100 kHz to 4.2 GHz	Wiltron Model 73
g	Precision RF attenuators (±1%) covering DC to 12.4 GHz minimum, Type N connectors (delete if plug-in has attenuator options)	3 dB - Systron-Donner 445-3 10 dB - Systron-Donner 445-10 20 dB - Systron-Donner 445-20
h	Absorption Frequency Meter, < 1 to > 4 GHz	Hewlett-Packard 536A or PRD LS-518
i	Type BNC and Type N Cables	As required

5.3.2 Alternate Test Equipment. In many cases, the recommended test equipment will not be available but alternate test equipment can be constructed from standard coaxial components and instruments.

POWER METER. The Systron-Donner Model 4020A is listed because it combines the features of an RF power meter and a logarithmic converter; in measurements requiring readout in logarithmic terms (decibel measurements), the 4020A will read directly in terms of the measurements. The output of the 4020A, when fed to a general-purpose linear oscilloscope, allows measurement in terms of 1.0 or 10.0 dB per linear graticule division.

If If such a power meter is not available, any high-quality power meter with a dynamic range of 50 dB may be used for power measurements. Some acceptable instruments are Hewlett-Packard Model 432A or 435, PRD 686, Boonton 42, etc. (all with appropriate temperature-compensated thermistor mounts).

DIRECTIONAL DETECTORS. If the specified directional detectors are not available, directional couplers covering the frequency range of the RF plug-in may be used. The coupling factor of the unit(s) must be 10 to 16 dB, and the coupled output must be fitted with a crystal detector rated for the same frequency range (refer to Item f of Table 5.1). The combined flatness error of the directional coupler(s) and crystal detector should not exceed ± .35 dB over the frequency range.

5.3.3 Initial Setup. Make the following checks and adjustments before beginning the performance checks; DO NOT connect primary (main) power until so instructed:

a. Install the RF plug-in and dial drum in accordance with the instructions in Paragraph 2.2; be sure to turn the locking knob at least five turns CCW before inserting the plug-in. Turn the locking knob CW to secure the plug-in.

b. Set the 540 F_1-START control to its maximum CCW position.

c. Set the 540 F_2-STOP control to its maximum CW position.

d. Depress and latch the CW MODULATION MODE switch.

e. Depress and latch the CW SWEEP MODE switch.

f. If the sweeper has a rear-panel INTENSITY MARKER ON/OFF switch, set it to OFF.

g. Check the rear-panel 115/230 V switch to be sure it is set to the proper position.

h. Check the value of the line fuse to be sure it matches the value required.

i. Depress and latch the plug-in front-panel LEVELING OFF switch.

j. Set the plug-in POWER control to its maximum CW position.

k. Using one of the Type N cables and a 10 dB attenuator, connect the RF output of the plug-in to the input of the frequency counter.

CAUTION

DAMAGE TO THE COUNTER WILL RESULT IF THE ATTENUATOR IS NOT USED.

l. Turn on the sweeper power switch, then allow the units to warm up for 5 to 10 minutes.

5.3.4 Frequency Accuracy. Frequency accuracy should be checked at an ambient air temperature of +25°C (+77°F). When setting the frequency dials, take care to view the pointer straight on to eliminate parallax:

a. Set the BAND SELECT switch to Band 1.

b. Carefully set the F_1-START, F_C/CW control so that the yellow pointer is aligned with the first major dial mark.

c. The frequency counter must show the indicated frequency ±10 MHz.

d. Repeat the test for as many dial marks as you wish to test (testing every 100 MHz is usually sufficient). The frequency tolerance must not exceed ±10 MHz of the indicated frequency at any point.

e. Set the BAND SELECT switch to Band 2.

f. Test as many dial settings as desired for frequency accuracy. In Band 2, a maximum error of ±1% is permissible (±10 MHz at 1 GHz, ±20 MHz at 2 GHz).

g. Set the BAND SELECT switch to Band 3 (Models 571A-1 and 571B only).

h. Check the dial accuracy; a maximum error of ±1% is permissible.

i. Set the BAND SELECT switch to Band 4.

j. Check the frequency accuracy; a maximum error of ±25 MHz is permissible to 1250 MHz. The maximum permissible error from 1250 MHz to 4200 MHz is ±2%.

5.3.5 Power Output and Internal Leveling Flatness:

a. Set the BAND SELECT switch to Band 1.

b. Depress and latch the INT LEVELING switch.

c. Depress and latch the SWEEP SPEED MANUAL SCAN switch.

d. Set the VERNIER/MANUAL SCAN control to its maximum CCW position.

e. Set the F_1-START control so that the frequency counter reads 10 MHz ±50 kHz.

f. Rotate the VERNIER/MANUAL SCAN control to maximum CW.

g. Set the F_2-STOP control so the counter reads 1000 MHz ±5 MHz.

h. Return the VERNIER/MANUAL SCAN control to maximum CCW and check the frequency reading; reset the F_1-START control if necessary.

i. Press and latch the MODULATION MODE RF OFF switch.

j. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line to reduce mismatch losses which might affect measurement accuracy and to avoid possible power meter damage.

k. Set the power meter to its 10 mW (+10 dBm) range (not necessary if Systron-Donner Model 4020A is used).

l. Depress and latch the MODULATION MODE CW switch.

m. While manually scanning the band, slowly reduce the POWER control setting until the UNLEVELED indicator is only illuminated at one or two points across the band.

n. Reduce the power output of the plug-in to the point where the UNLEVELED indicator just goes out at the last unleveled point in the band.

o. Set the power meter range switch to the position which allows the best resolution.

p. Check the power meter reading while manually scanning the entire band; the minimum power must not be less than 10 mW (+10 dBm). Because a 10 dB attenuator was used, the power meter reading will be ≥ 1.0 mW (0 dBm).

q. Vary the MANUAL SCAN control over its full range again; check the power meter reading to ensure that the total power level variation over the band does not exceed 1.4 dB. This verifies the flatness specification of ≤ 0.7 dB.

r. Set the BAND SELECT switch to Band 2.

s. Press the RF OFF switch and reconnect the RF output of the plug-in (through the 10 dB attenuator) to the frequency counter.

t. Press the CW switch; advance the POWER control fully CW.

u. Set the band limits to manually scan 1000 ±5 MHz to 2000 ±10 MHz.

v. Press and latch the MODULATION MODE RF OFF switch.

w. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

the 10 dB attenuator must remain in the line.

x. Set the power meter to its highest power range (not necessary if Systron-Donner Model 4020A is used).

y. Depress and latch the MODULATION MODE CW switch.

z. While manually scanning the band, slowly reduce the POWER control setting until the UNLEVELED indicator is only illuminated at one or two points across the band.

aa. Reduce the power output of the plug-in to the point where the UNLEVELED indicator just goes out at the last unleveled point in the band.

ab. Set the power meter range switch to the position which allows the best resolution.

ac. Check the power meter reading while manually scanning the entire band; the minimum power must not be less than 15 mW (+11.76 dBm). Because a 10 dB attenuator was used, the power meter reading will be ≥1.5 mW (+1.76 dBm).

ad. Vary the MANUAL SCAN control over its full range again; check the power meter reading to ensure that the total power level variation over the band does not exceed 1.4 dB. This verifies the flatness specification of ≤0.7 dB.

NOTE

Steps ae through au apply only to Models 571A-1 and 571B; if the performance of a 571A-2 plug-in is being checked, proceed directly to step av.

ae. Set the BAND SELECT switch to Band 3.

af. Press the RF OFF switch and reconnect the RF output of the plug-in (through the 10 dB attenuator) to the frequency counter.

ag. Press the CW switch; advance the POWER control fully CW.

ah. Set the band limits to manually scan 2000 ±10 MHz to 4000 ±20 MHz.

ai. Press and latch the MODULATION MODE RF OFF switch.

aj. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line.

ak. Set the power meter to its 10 mW (+10 dBm) range (not necessary if Systron-Donner Model 4020A is used).

al. Depress and latch the MODULATION MODE CW switch.

am. While manually scanning the band, slowly reduce the POWER control setting until the UNLEVELED indicator is only illuminated at one or two points across the band.

an. Reduce the power output of the plug-in to the point where the UNLEVELED indicator just goes out at the last unleveled point in the band.

ao. Set the power meter range switch to the position which allows the best resolution.

ap. Check the power meter reading while manually scanning the entire band; the minimum power must not be less than 10 mW (+10 dBm). Because a 10 dB attenuator was used, the power meter reading will be ≥ 1.0 mW (0 dBm).

aq. Vary the MANUAL SCAN control over its full range again; check the power meter reading to ensure that the total power level variation over the band does not exceed 1.4 dB. This verifies the flatness specification of ≤ 0.7 dB.

ar. With the MANUAL SCAN control set to its maximum CW position, slowly increase the maximum frequency limit by rotating the F_2-STOP control CW.

as. Watch the power meter, and cease increasing the frequency limit when the power meter reading drops to 800 μW (-0.97 dBm). If the power meter reading does not drop to this level, it is unnecessary to perform steps at and au.

at. Transfer the output cable and attenuator to the frequency counter.

au. Determine that the 8 mW power point is ≥ 4200 MHz. The minimum leveled output specification of 8 mW from 4000 to 4200 MHz is met when this test is positive.

av. Set the BAND SELECT switch to Band 4.

aw. Set the manual scan sweep limits to 10 MHz ±50 kHz at the low-frequency end and 4000 ±20 MHz at the high-frequency end (2000 ±10 MHz if a 571A-2 is being tested).

ax. Press and latch the MODULATION MODE RF OFF switch.

ay. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line.

az. Set the power meter to its 10 mW (+10 dBm) range (not necessary if Systron-Donner Model 4020A is used).

ba. Depress and latch the MODULATION MODE CW switch.

bb. While manually scanning the band, slowly reduce the POWER control setting until the UNLEVELED indicator is only illuminated at one or two points across the band.

bc. Reduce the power output of the plug-in to the point where the UNLEVELED indicator just goes out at the last unleveled point in the band.

bd. Set the power meter range switch to the position which allows the best resolution.

be. Check the power meter reading while manually scanning the entire band; the minimum power must not be less than 10 mW (+10 dBm). Because a 10 dB attenuator was used, the power meter reading will be ≥ 1.0 mW (0 dBm).

bf. Vary the MANUAL SCAN control over its full range again; check the power meter reading to ensure that the total power level variation over the band does not exceed 1.4 dB. This verifies the flatness specification of ≤±0.7 dB.

NOTE

This concludes the power output and internal leveling flatness performance checks for Model 571A-2.

bg. With the MANUAL SCAN control set to its maximum CW position, slowly increase the maximum frequency limit by rotating the F_2-STOP control CW.

bh. Watch the power meter, and cease increasing the frequency limit when the power meter reading drops to 800 μW (-0.97 dBm). If the power meter reading does not drop to this level, it is unnecessary to perform steps bi and bj.

bi. Transfer the output cable and attenuator to the frequency counter.

bj. Determine that the 8 mW power point is ≥4200 MHz. The minimum leveled output specification of 8 mW from 4000 to 4200 MHz is met when this test is positive.

bk. This concludes the power output and internal leveling flatness performance checks for Models 571A-1 and 571B.

5.3.6 Off-Leveling Power Variation:

a. Set the BAND SELECT switch to Band 1.

b. Depress and latch the OFF LEVELING switch.

c. Depress and latch the SWEEP SPEED MANUAL SCAN switch.

d. Set the VERNIER/MANUAL SCAN control to its maximum CCW position.

e. Set the F_1-START control so that the frequency counter reads 10 MHz ±50 kHz.

f. Rotate the VERNIER/MANUAL SCAN control to maximum CW.

g. Set the F_2-STOP control so the counter reads 1000 MHz ±5 MHz.

h. Return the VERNIER/MANUAL SCAN control to maximum CCW and check the frequency reading; reset the F_1-START control if necessary.

i. Press and latch the MODULATION MODE RF OFF switch.

j. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line to reduce mismatch losses which might affect measurement accuracy and to avoid possible power meter damage.

k. Set the power meter to its 10 mW (+10 dBm) range (not necessary if Systron-Donner Model 4020A is used).

l. Depress and latch the MODULATION MODE CW switch.

m. Set the POWER control to its maximum CW position; leave it at this position for the rest of this procedure.

n. Slowly vary the MANUAL SCAN control over its full range.

o. Set power meter range switch to the position which allows the best resolution.

p. Verify that the maximum power variation (P_{max}-P_{min}) does not exceed 8.0 dB.

q. Set the BAND SELECT switch to Band 2.

r. Press the RF OFF switch and reconnect the RF output of the plug-in (through the 10 dB attenuator) to the frequency counter.

s. Set the band limits to manually scan 1000 ±5 MHz to 2000 ±10 MHz.

t. Press and latch the MODULATION MODE RF OFF switch.

u. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line.

v. Set the power meter to its highest power range (not necessary if Systron-Donner Model 4020A is used.

w. Depress and latch the MODULATION MODE CW switch.

x. Slowly vary the MANUAL SCAN control over its full range.

y. Set the power meter range switch for best resolution.

z. Verify that the maximum power variation is ≤8.0 dB.

NOTE

Steps aa through aj apply only to Models 571A-1 and 571B; if a 571A-2 is being checked, proceed directly to step ak.

aa. Set the BAND SELECT switch to Band 3.

ab. Press the RF OFF switch and reconnect the RF output of the plug-in (through the 10 dB attenuator) to the frequency counter.

ac. Set the band limits to manually scan 2000 ±10 MHz to 4200 ±21 MHz.

ad. Press and latch the MODULATION MODE RF OFF switch.

ae. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line.

af. Set the power meter to its 10 mW (+10 dBm) range (not necessary if Systron-Donner Model 4020A is used).

ag. Depress and latch the MODULATION MODE CW switch.

ah. Slowly vary the MANUAL SCAN control over its full range.

ai. Set the power meter range switch for best resolution.

aj. Verify that the maximum power variation is ≤ 8.0 dB.

ak. Press and latch the MODULATION MODE RF OFF switch.

al. Set the BAND SELECT switch to Band 4.

am. Connect the RF output of the plug-in (through the 10 dB attenuator) to the appropriate input of the frequency counter.

an. Depress and latch the MODULATION MODE CW switch.

ao. Set the manual scan sweep limits to 10 MHz ±50 kHz at the low-frequency end and 4000 ±20 MHz at the high-frequency end (2000 ±10 MHz if a 571A-2 is being tested).

ap. Press and latch the MODULATION MODE RF OFF switch.

aq. Remove the input connector from the counter and connect it to the thermistor mount or power head of the power meter.

IMPORTANT

The 10 dB attenuator must remain in the line.

ar. Set the power meter to its 10 mW (+10 dBm) range (not necessary if Systron-Donner Model 4020A is used).

as. Depress and latch the MODULATION MODE CW switch.

at. Slowly vary the MANUAL SCAN control over its full range.

au. Set power meter range switch to the position which allows the best resolution.

av. Verify that the maximum power variation (P_{max} - P_{min}) does not exceed 8.0 dB.

aw. This concludes the off-level power variation checks for Models 571A-1, 571B, and 571A-2.

5.3.7 Residual Amplitude Modulation:

a. Set the BAND SELECT switch to Band 1.

b. Depress and latch the SWEEP MODE F_1-F_2 switch.

c. Set the F_1-START control so the F_1-START frequency indicator is about 3/8 of the way between the lowest and highest marked frequencies.

d. Set the F_2-STOP control so the F_2-STOP frequency indicator is about 5/8 of the way between the lowest and highest frequency marks (residual AM is generally highest at mid-band; performance will be checked under worst-case conditions).

e. Depress and latch the MODULATION MODE CW switch.

f. Set the RETRACE switch for off (out).

g. Depress and latch the SWEEP SPEED FAST switch.

h. Depress and latch the INT TRIGGER switch.

i. Attach a 10-dB attenuator to the RF OUT connector (or set the optional built-in attenuator of the plug-in for 10 dB).

j. Attach a crystal detector to the output of the 10-dB attenuator (or to the RF OUT connector if the optional internal attenuator was used).

k. Connect the output of the crystal detector to the vertical input of the oscilloscope plug-in.

l. Set the oscilloscope bandwidth controls for a lower limit of DC and an upper limit of 30 kHz.

m. Set the oscilloscope time-base controls for an internally-generated free-running trace; use any convenient sweep rate.

n. Set the oscilloscope coupling to ground and carefully zero the trace.

o. Depress and latch the LEVELING OFF switch.

p. Turn the POWER control fully CW.

q. Set the vertical sensitivity of the oscilloscope to 5 mV/division (this may be changed later to obtain the most accurate reading).

r. Set the oscilloscope coupling switch to "dc".

s. Measure and note the dc amplitude of the detected RF output; use the sweep retrace line as zero and the peak level of the unsynchronized trace as V_o (output voltage). Resolve as closely as possible.

t. Set the oscilloscope coupling switch to "ac".

u. Depress and latch the RETRACE switch.

v. Measure the p-p voltage of the detected waveform.

w. Divide the amplitude V_o noted in step s by 200; verify that the signal level measured in step v is less than this figure ($V_o \div 200 = 46$ dB).

x. Depress and latch the INT LEVELING switch.

y. Remove the crystal detector from the output of the 10-dB attenuator.

z. Connect a power meter to the output of the attenuator.

aa. Adjust the POWER control for a power meter reading of 1.0 mW (0 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 1, taking the 10-dB attenuator into account.

ab. Without changing the setting of the POWER control, disconnect the power meter from the output of the 10-dB attenuator and re-connect the crystal.

ac. Set the oscilloscope coupling switch to "dc".

ad. Depress and release the RETRACE switch.

ae. Measure and note the dc amplitude of the detected RF output from sweep retrace (zero) to peak (V_o).

af. Set the oscilloscope coupling switch to "ac".

ag. Depress and latch the RETRACE switch.

ah. Measure the p-p value of the detected waveform.

ai. Verify that the leveled mode residual AM index is at least 40 dB by dividing the amplitude V_o (step ae) by 100 ($V_o \div 100 = 40$ dB).

aj. Set the BAND SELECT switch to Band 2.

ak. Depress and latch the LEVELING OFF switch.

al. Turn the POWER control fully CW.

am. Depress and release the RETRACE switch.

an. Set the oscilloscope coupling switch to "dc".

ao. Measure and note the dc amplitude of the detected RF output; use the sweep retrace line as zero and the peak level of the unsynchronized trace as V_o (output voltage). Resolve as closely as possible.

ap. Set the oscilloscope coupling switch to "ac".

aq. Depress and latch the RETRACE switch.

ar. Measure the p-p voltage of the detected waveform.

as. Divide the amplitude V_0 noted in step ao by 200; verify that the signal level measured in step ar is less than this figure ($V_0 \div 200 = 46$ dB).

at. Depress and ltach the INT LEVELING switch.

au. Remove the crystal detector from the output of the 10-dB attenuator.

av. Connect a power meter to the output of the attenuator.

aw. Adjust the POWER control for a power meter reading of 1.5 mW (+1.76 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 2, taking the 10-dB attenuator into account.

ax. Without changing the setting of the POWER control, disconnect the power meter from the output of the 10-dB attenuator and re-connect the crystal.

ay. Set the oscilloscope coupling switch to "dc".

az. Depress and release the RETRACE switch.

ba. Measure and note the dc amplitude of the detected RF output from sweep retrace (zero) to peak (V_0).

bb. Set the oscilloscope coupling switch to "ac".

bc. Depress and latch the RETRACE switch.

bd. Measure the p-p value of the detected waveform.

be. Verify that the leveled mode residual AM index is at least 40 dB by dividing the amplitude V_0 (step ba) by 100 ($V_0 \div 100 = 40$ dB).

NOTE

Steps bf through ca apply to Models 571A-1 and 571B. If a 571A-2 plug-in is being checked, proceed directly to step cb.

bf. Set the BAND SELECT switch to Band 3.

bg. Depress and latch the LEVELING OFF switch.

bh. Turn the POWER control fully CW.

bi. Depress and release the RETRACE switch.

bj. Set the oscilloscope coupling switch to "dc".

bk. Measure and note the dc amplitude of the detected RF output; use the sweep retrace line as zero and the peak level of the unsynchronized trace as V_0) (output voltage). Resolve as closely as possible.

bl. Set the oscilloscope coupling switch to "ac".

bm. Depress and latch the RETRACE switch.

bn. Measure the p-p voltage of the detected waveform.

bo. Divide the amplitude V_0 noted in step bk by 200; verify that the signal level measured in step bn is less than this figure ($V_0 \div 200 = 46$ dB).

bp. Depress and latch the INT LEVELING switch.

bq. Remove the crystal detector from the output of the 10-dB attenuator.

br. Connect a power meter to the output of the attenuator.

bs. Adjust the POWER control for a power meter reading of 1.0 mW (0 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 3, taking the 10-dB attenuator into account.

bt. Without changing the setting of the POWER control, disconnect the power meter from the output of the 10-dB attenuator and re-connect the crystal.

bu. Set the oscilloscope coupling switch to "dc".

bv. Depress and release the RETRACE switch.

bw. Measure and note the dc amplitude of the detected RF output from sweep retrace (zero) to peak (V_0).

bx. Set the oscilloscope coupling switch to "ac".

by. Depress and latch the RETRACE switch.

bz. Measure the p-p value of the detected waveform.

ca. Verify that the leveled mode residual AM index is at least 40 dB by dividing the amplitude V_0 (step bv) by 100 ($V_0 \div 100 = 40$ dB).

cb. This concludes the residual amplitude modulation performance checks.

5.3.8 Residual Frequency Modulation:

a. Set the BAND SELECT switch to Band 1.

b. Depress and latch the SWEEP MODE switch.

c. Set the F_c/CW control so the F_c/CW frequency indicator is at mid-band.

d. Depress and latch the SLOW SWEEP SPEED.

e. Press the EXT/MAN TRIGGER switch.

f. Press and latch the RETRACE switch.

g. Depress and latch the INT LEVELING switch.

h. Attach a 10-dB attenuator to the RF OUT connector (or set the optional built-in attenuator to 10 dB).

i. Set the spectrum analyzer input attenuator to 20 dB; this may be changed later.

j. Connect a power meter to the output of the attenuator.

k. Adjust the POWER control for a power meter reading of 1.0 mW (0 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 1, taking the 10-dB attenuator into account.

l. Without changing the setting of the POWER control, disconnect the power meter from the output attenuator.

m. Connect a cable between the output of the attenuator and the spectrum analyzer RF input.

n. Tune the spectrum analyzer to the output frequency of the plug-in; adjust the RF and IF attenuators for a display of the carrier aligned with the logarithmic reference line of the analyzer display.

IMPORTANT

Be sure the input signal amplitude is not excessive. Spurious products generated within the spectrum analyzer by excessive input levels will compromise measurement accuracy.

o. Adjust the spectrum analyzer controls to phase-lock the analyzer to the input signal.

p. Adjust the spectrum analyzer dispersion control(s) for 3 or 5 kHz/division.

q. Adjust the spectrum analyzer bandwidth control(s) to 10 kHz.

r. Set the sweep speed control(s) for a slow sweep, about 1 second/division.

s. As the spectrum analyzer CRT trace reaches the log reference level, measure the number of horizontal divisions covered by the trace at the logarithmic reference level. Measure several cycles.

t. Multiply the number of divisions covered by the trace at the peak level by the dispersion figure. Verify that the residual FM content is less than 10 kHz.

u. Set the BAND SELECT switch to Band 2.

v. Disconnect the spectrum analyzer input cable from the attenuator output.

w. Connect a power meter to the output of the attenuator.

x. Adjust the POWER control for a power meter reading of 1.5 mW (+1.76 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 2, taking the 10-dB attenuator into account.

y. Without changing the setting of the POWER control, disconnect the power mete meter from the output attenuator.

z. Connect a cable between the output of the attenuator and the spectrum analyzer RF input.

aa. Tune the spectrum analyzer to the output frequency of the plug-in; adjust the RF and IF attenuators for a display of the carrier aligned with the logarithmic reference line of the analyzer display. Do not overload the spectrum analyzer.

ab. Adjust the spectrum analyzer controls to phase-lock the analyzer to the input signal.

ac. As the spectrum analyzer CRT trace reaches the log reference level, measure the number of horizontal divisions covered by the trace at the logarithmic reference level. Measure several cycles.

ad. Multiply the number of divisions covered by the trace at the peak level by the dispersion figure. Verify that the residual FM content is less than 10 kHz.

NOTE

Steps ae through an apply to Models 571A-1 and 571B.
If a 571A-2 is being tested, proceed directly to step ao.

ae. Set the BAND SELECT switch to Band 3.

af. Disconnect the spectrum analyzer input cable from the output of the attenuator.

ag. Connect a power meter to the output of the attenuator.

ah. Adjust the POWER control for a power meter reading of 1.0 mW (0 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 3, taking the 10-dB attenuator into account.

ai. Without changing the setting of the POWER control, disconnect the power meter from the output attenuator.

aj. Connect a cable between the output of the attenuator and the spectrum analyzer RF input.

ak. Tune the spectrum analyzer to the output frequency of the plug-in; adjust the RF and IF attenuators for a display of the carrier aligned with the logarithmic reference line of the analyzer display; do not overload the input.

al. Adjust the spectrum analyzer controls to phase-lock the analyzer to the input signal.

am. As the spectrum analyzer CRT trace reaches the log reference level, measure the number of horizontal divisions covered by the trace at the logarithmic reference level. Measure several cycles.

an. Multiply the number of divisions covered by the trace at the peak level by the dispersion figure. Verify that the residual FM content is less than 10 kHz.

ao. Set the BAND SELECT switch to Band 4.

ap. Set the F_c/CW frequency control for mid-band.

ar. Disconnect the spectrum analyzer input cable from the output of the attenuator.

as. Connect a power meter to the output of the attenuator.

at. Adjust the POWER control for a power meter reading of 1.0 mW (0 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 4, taking the 10-dB attenuator into account.

au. Without changing the setting of the POWER control, disconnect the power meter from the output attenuator.

av. Connect a cable between the output of the attenuator and the spectrum analyzer RF input.

aw. Tune the spectrum analyzer to the output frequency of the plug-in; adjust the RF and IF attenuators for a display of the carrier aligned with the logarithmic reference line of the analyzer display.

ax. Adjust the spectrum analyzer controls to phase-lock the analyzer to the input signal.

ay. Adjust the spectrum analyzer dispersion control(s) for 5 or 10 kHz/division.

az. As the spectrum analyzer CRT trace reaches the log reference level, measure the number of horizontal divisions covered by the trace at the logarithmic reference level. Measure several cycles.

ba. Multiply the number of divisions covered by the trace at the peak level by the dispersion figure. Verify that the residual FM content is less than 20 kHz.

bb. This concludes the residual FM performance checks for Models 571A-1, 571A-2, and 571B.

5.3.9 Spurious and Harmonic Content:

a. Set the BAND SELECT switch to Band 1.

b. Depress and latch the SWEEP MODE CW switch.

c. Set the F_c/CW control so the F_c/CW frequency indicator is at mid-band.

d. Depress and latch the SLOW SWEEP SPEED switch.

e. Press the EXT/MAN TRIGGER switch.

f. Press and latch the RETRACE switch.

g. Depress and latch the INT LEVELING switch.

h. Attach a 10-dB attenuator to the RF OUT connector (or set the optional built-in attenuator to 10 dB).

i. Set the spectrum analyzer input attenuator to 20 dB; this may be changed later.

j. Connect a power meter to the output of the attenuator.

k. Adjust the POWER control for a power meter reading of 1.0 mW (0 dBm). This sets the output level of the plug-in to the rated leveled output amplitude in Band 1, taking the 10-dB attenuator into account.

l. Without changing the setting of the POWER control, disconnect the power meter from the output attenuator.

m. Connect a cable between the output of the attenuator and the spectrum analyzer RF input.

n. Tune the spectrum analyzer to the output frequency of the plug-in (about 500 MHz); adjust the RF and IF attenuators for a display of the carrier aligned with the logarithmic reference line of the analyzer display.

IMPORTANT

Be sure the input signal amplitude is not excessive. Spurious products generated within the spectrum analyzer by excessive input levels will compromise measurement accuracy.

o. Adjust the spectrum analyzer dispersion control(s) for 1 MHz/division.

p. Tune the spectrum analyzer over the frequency range of 10 MHz to 1 GHz; use the spectrum analyzer manufacturer's recommended signal identification procedures to determine that any observed signal within 25 dB of the log reference level is "real" and not a spurious response generated within the spectrum analyzer. Ignore responses within 1 MHz of the carrier frequency.

q. Verify that any spurious responses within the 10 to 1000 MHz band which are not generated within the spectrum analyzer, and are not within 1 MHz of the carrier frequency, are at least 25 dB down from carrier level.

r. Check the second, third, and fourth harmonic frequencies; verify that harmonic outputs are at least 20 dB below carrier level.

s. Set the BAND SELECT switch to Band 2.

t. Set the POWER control fully CW.

u. Depress and latch the LEVELING OFF switch.

v. Tune the spectrum analyzer to the output frequency of the plug-in (approximately 1.5 GHz); adjust the RF and IF attenuators for a display of the carrier aligned with the log reference line of the analyzer display. Be careful not to overload the spectrum analyzer input.

w. Tune the spectrum analyzer over the frequency range of 1 to 2 GHz; use the spectrum analyzer manufacturer's recommended signal identification procedures to determine that any observed signal within 60 dB of the log reference level is "real" and not a spurious response generated within the spectrum analyzer. Ignore responses within 1 MHz of the carrier frequency.

x. Verify that any spurious responses within the 1 to 2 GHz band which are not generated within the spectrum analyzer, and are not within 1 MHz of the carrier frequency, are at least 60 dB down from carrier level.

y. Check the second, third, and fourth harmonic frequencies; verify that harmonic outputs are at least 20 dB below carrier level.

NOTE

This concludes the spurious and harmonic content checks for Model 571A-2; if a Model 571A-1 or 571B is being checked, continue with step z.

z. Set the BAND SELECT switch to Band 3.

aa. Tune the spectrum analyzer to the output frequency of the plug-in (approximately 3 GHz); adjust the RF and IF attenuators for a display of the carrier aligned with the log reference line of the analyzer display. Be careful not to overload the spectrum analyzer input.

ab. Tune the spectrum analyzer over the frequency range of 2 to 4.2 GHz; use the spectrum analyzer manufacturer's recommended signal identification procedures to determine that any observed signal within 60 dB of the log reference level is "real" and not a spurious response generated within the spectrum analyzer. Ignore responses within 1 MHz of the carrier frequency.

ac. Verify that any spurious responses within the 2 to 4.2 GHz band which are not generated within the spectrum analyzer, and are not within 1 MHz of the carrier frequency, are at least 60 dB down from carrier level.

ad. Check the second, third, and fourth harmonic frequencies; verify that harmonic outputs are at least 20 dB below carrier level.

ae. This concludes the spurious and harmonic content checks for Models 571A-1 and 571B.

5.4 CALIBRATION

5.4.1 Equipment Required. The equipment listed below will be required, in addition to the equipment listed in Table 5.1. Be sure all test equipment is in calibration. Equivalent equipment may be used if it is at least as accurate as the equipment cited:

a. Power Supply, +12 VDC

b. Digital Voltmeter, Systron-Donner Model 7003.

5.4.2 Plug-in Extender. If the specified Systron-Donner Model 593 plug-in extension cable is not available, the plug-in can be calibrated using an alternate method. It is not possible to calibrate the plug-in while it is in place in the mainframe. Use great care in performing the following procedures, as terminals carrying lethal voltages will be exposed.

a. Disconnect the power cord of the mainframe.

b. Remove the RF plug-in from the mainframe.

c. Remove the top cover of the mainframe.

d. Remove two screws holding plug-in interface connector J1 in place in the mainframe.

e. Carefully bring the connector up out of the interior of the mainframe.

f. Lay a piece of plastic or other insulating supporting material across the top of the mainframe.

g. Remove the top and bottom covers of the plug-in.

h. Lay the plug-in on one of its sides on top of the insulating support installed in step f.

i. Using care to avoid placing strain on the wire bundle or connector pins, rotate the interface connector and mate it with the plug-in's interface connector.

WARNING

YOU WILL BE EXPOSED TO LETHAL VOLTAGES
DURING THE ENTIRE CALIBRATION PROCEDURE
IF THIS METHOD IS USED.

5.4.3 Test Point and Adjustment Locations. All test points and adjustments referred to in this procedure are shown in Figures 5.1 and 5.2.

5.4.4 Initial Setup. Make the following connections and control settings:

a. Connect the power cord to a suitable power outlet.

b. Ensure mainframe power is off.

c. Depress and latch the MODULATION MODE CW switch.

d. Set the BAND SELECT switch to Band 2.

e. Press and release the RETRACE switch.

f. Depress and latch the INT TRIGGER switch.

g. Depress and latch the CW SWEEP MODE switch.

h. Depress and latch the FAST SWEEP SPEED switch.

i. Depress and latch the INT LEVELING switch.

j. Connect a 10-dB attenuator to the RF OUT connector or set the optional internal attenuator to 10 dB.

k. Set the POWER control fully CCW.

l. Connect a cable from the output of the attenuator to the input of the frequency counter.

5.4.5 Frequency Calibration:

A4 YIG DRIVER. Make the following adjustments on all 571A-1, 571A-2, and 571B plug-ins:

a. Connect a test jumper wire between A2TP2 and A2TP6 (refer to Figure 5.2).

b. Connect a test jumper wire between A2TP1 and A2TP13.

c. Turn mainframe power on and allow the units to stabilize for approximately 5 minutes.

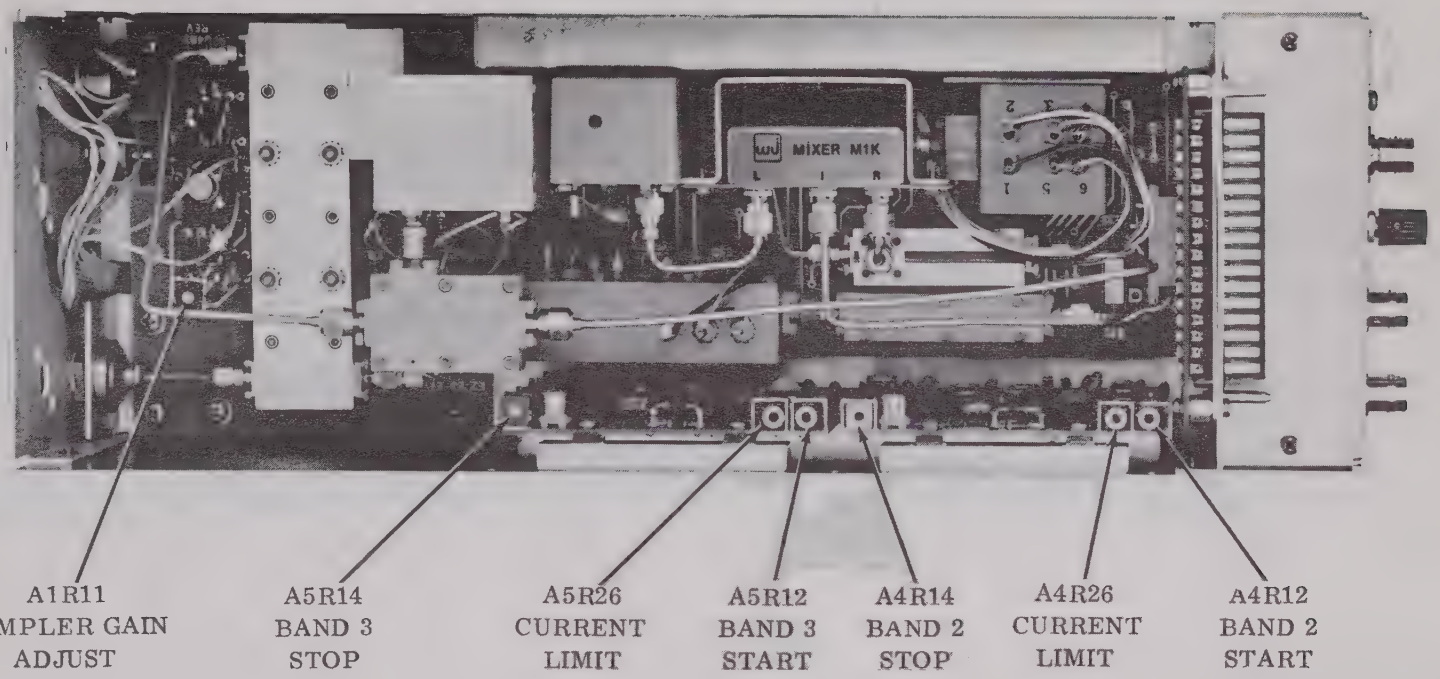


Figure 5.1 Top-Panel Adjustments

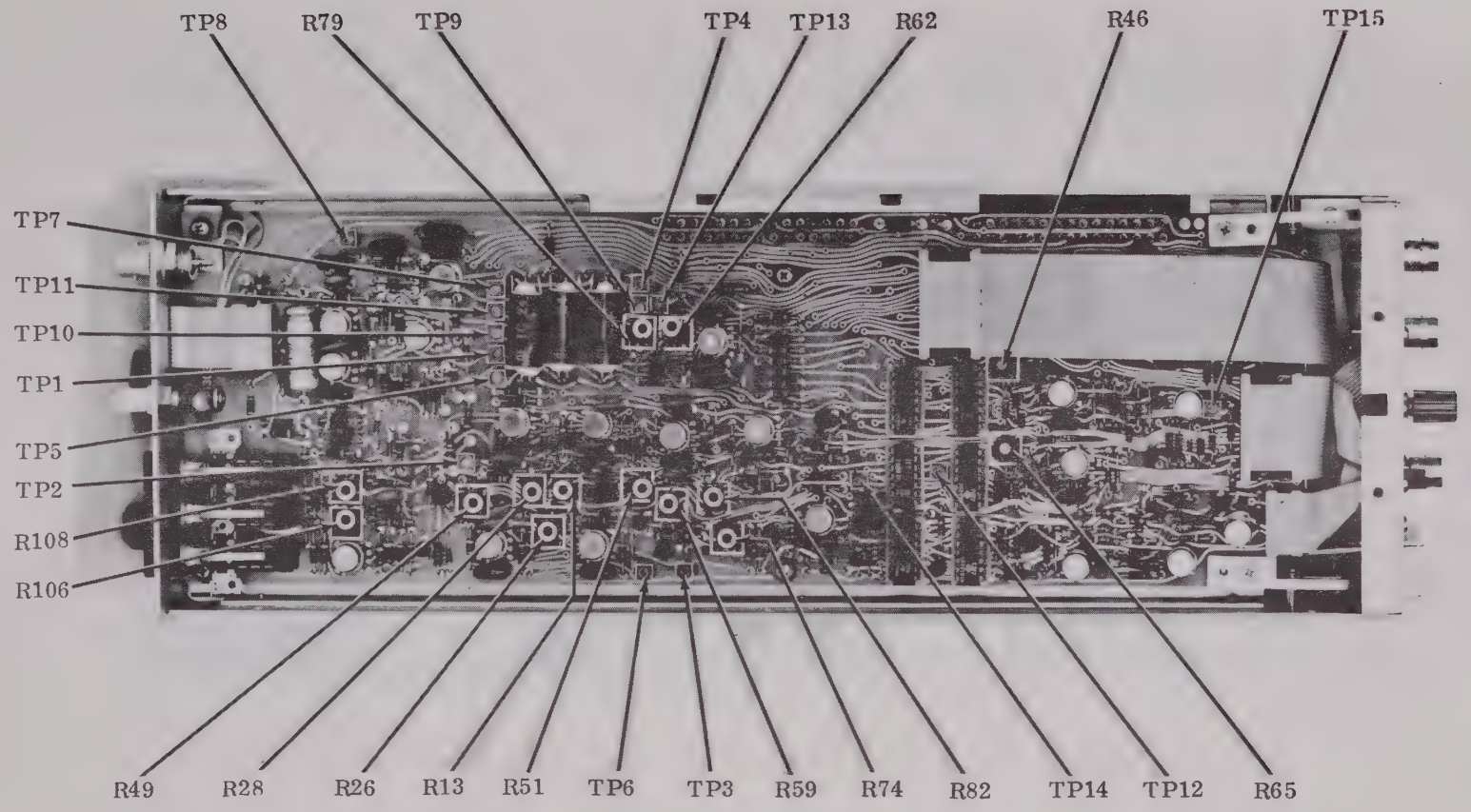


Figure 5.2 571A Bottom-Panel Test Points and Adjustments
(Sheet 1 of 2)

TEST POINT	FUNCTION
A2TP1	Frequency Reference Voltage
A2TP2	+5 V
A2TP3	Frequency Reference Voltage Ground
A2TP4	Tuning Reference, Band 2
A2TP5	Continuous Sweep Tuning Reference, Band 3
A2TP6	Band 2 Disable
A2TP7	Tuning Reference, Band 3
A2TP8	Linear Ground
A2TP9	Tuning Reference, Band 1
A2TP10	Continuous Sweep Tuning Reference, Band 1
A2TP11	Continuous Sweep Tuning Reference, Band 2
A2TP12	Lower Crossover Voltage
A2TP13	Tuning Reference, Bands 1 and 2
A2TP14	Upper Crossover Voltage
A2TP15	AM Voltage

ADJUSTMENT	FUNCTION
A2R13	Continuous Sweep Band 3 Start
A2R26	Band 2 F Start
A2R28	Continuous Sweep Band 3 Stop
A2R46	Band 2/Band 3 Crossover
A2R49	Band 2 F-Stop
A2R51	Continuous Sweep Band 1 Start
A2R59	Continuous Sweep Band 1 Stop
A2R62	Band 1 F-Stop
A2R65	Band 1/Band 2 Crossover
A2R74	Continuous Sweep Band 2 Start
A2R79	Band 1 F-Start
A2R82	Continuous Sweep Band 2 Stop
A2R106	Detector Tracking (Internal Leveling, Band 1)
A2R108	Detector Offset (Internal Leveling, Band 1)

Figure 5.2 571A Bottom-Panel Test Points and Adjustments
(Sheet 2 of 2)

e. Adjust POWER control to provide a stable signal for the counter.

f. Adjust A4R12 (refer to Figure 5.1) for a frequency of 975 ±5 MHz.

g. Adjust the F_C/CW control to place the indicator over the highest marked frequency on the dial.

h. Adjust A4R14 for a frequency of 2225 ±5 MHz.

i. Connect the -12 V output of the power supply to the mainframe rear-panel EXT TUNE connector.

j. Monitor the power supply output with the voltmeter; adjust the power supply for -12.00 ±.05 VDC.

k. Depress and latch the SWEEP MODE EXT TUNE switch.

l. Adjust A4R26 (Figure 5.1) to limit at approximately 2300 MHz.

m. Turn mainframe power off.

n. Remove the test jumpers installed in steps a and b.

A5 YIG DRIVER. Make the following adjustments on 571A-1 and 571B plug-ins:

a. Turn mainframe power on.

b. Depress and latch the SWEEP MODE CW switch.

c. Set the BAND SELECT switch to Band 3.

d. Set the F_C/CW control to place the indicator over the lowest marked frequency on the dial.

e. Adjust A5R12 (Figure 5.1) for a frequency of 1900 ±5 MHz.

f. Adjust F_C/CW for the highest marked frequency.

g. Adjust A5R14 (Figure 5.1) for 4200 ±5 MHz.

h. Depress and latch the SWEEP MODE EXT TUNE switch.

i. With the input voltage a -12.00 ±.05 VDC, adjust A5R26 to limit at approximately 4300 MHz.

A2 RANGE AMPLIFIERS. The following adjustments are required for all units:

a. Set the BAND SELECT switch to Band 1.

b. Adjust the F_C/CW control so the indicator is directly over the highest frequency dial mark.

c. Adjust A2R62 (Figure 5.2) for 1020 ± 5 MHz.

d. Set the F_C/CW indicator over the lowest frequency mark on the dial.

e. Adjust A2R79 (Figure 5.2) for the lowest possible frequency - zero is ideal, but any reading up to 5 MHz is acceptable.

f. Repeat steps b through e.

g. Adjustments A2R62 and A2R79 interact; repeat the adjustments of these controls until the specified frequency range has been set.

h. Set the BAND SELECT switch to Band 2.

i. Set the F_C/CW indicator over the lowest frequency mark on the Band 2 dial.

j. Adjust A2R26 (Figure 5.2) for a frequency of 980 ± 5 MHz.

k. Set the F_C/CW indicator over the highest frequency mark.

l. Adjust A2R49 for 2020 ± 5 MHz.

m. Repeat steps i through l until the specified frequency range has been set.

CONTINUOUS SWEEP ADJUSTMENTS. The following procedures make use of an absorption-type coaxial frequency meter (wavemeter) to set band crossovers and frequency limits in continuous sweep mode. If desired, a frequency counter may be used in addition to the wavemeter:

a. Disconnect the coaxial cable from the frequency counter and connect it to the input of the wavemeter.

b. Connect a crystal detector to the output of the wavemeter.

c. Connect a cable between the crystal detector output and the Y-axis input of the oscilloscope.

d. Connect a cable between the mainframe (540, 540A, 540B) SWEEP OUTPUT connector and the X-axis input of the oscilloscope (adjusted for 1 V/Division).

e. Set the BAND SELECT switch to Band 4.

f. Adjust the POWER control until the UNLEVELED indicator illuminates, then retard the setting of the POWER control about one dial marking.

g. Set the F_C/CW indicator to the lowest frequency marking on the dial.

h. Set the ΔF WIDTH control to 50 MHz.

i. Depress and latch the SWEEP MODE $F_C \pm \Delta F$ switch.

j. Adjust A2R51 (Figure 5.2) for an oscilloscope display showing a zero-beat in the center of the screen (refer to Figure 3.3, Detail D).

k. Set the F_C/CW control to place the indicator directly over the 1.0 GHz dial marking.

l. Adjust A2R65 (Figure 5.2) to place the Band 1/Band 2 crossover intensity dot at the exact center of the oscilloscope X-axis graticule marking.

m. Set the wavemeter to 1006 MHz.

n. Adjust A2R59 (Figure 5.2) to place the marker pip directly over the crossover dot.

o. Set the wavemeter to 994 MHz.

p. Adjust A2R74 (Figure 5.2) to place the marker pip directly over the crossover dot.

q. Set the wavemeter to 1000 MHz. Verify that two marker pips are present, one on either side of the crossover dot. The two markers should be about 0.6 graticule divisions from the intensity dot, indicating a frequency overlap at the Band 1/Band 2 crossover of approximately 12 MHz.

NOTE

Perform steps r through v if a 571A-2 is being calibrated; if a 571A-1 or 571B is being calibrated go on to step w.

r. Set the F_C/CW control to place the indicator directly over the far right-hand dial marking.

s. Set the wavemeter to 2200 MHz.

t. Adjust A2R82 (Figure 5.2) to center the marker on the oscilloscope X-axis graticule.

u. Repeat steps g through t.

v. This concludes the frequency calibration for 571A-2; go on to Paragraph 5.4.6.

w. Set the F_C/CW control to place the indicator directly over the 2.0 GHz dial marking.

x. Adjust A2R46 (Figure 5.2) to place the Band 2/Band 3 crossover intensity dot at the center of the oscilloscope graticule.

y. Set the wavemeter to 2006 MHz.

z. Adjust A2R82 (Figure 5.2) to place the marker pip directly over the crossover dot.

aa. Set the wavemeter to 1994 MHz.

ab. Adjust A2R13 (Figure 5.2) to place the marker pip directly over the crossover dot.

ac. Set the wavemeter to 2000 MHz. Verify a Band 2/Band 3 frequency overlap of approximately 12 MHz as indicated by two marker pips 0.6 graticule divisions from the crossover intensity dot.

ad. Set the F_c/CW control to place the indicator over the far right-hand dial marking.

ae. Set the wavemeter to 4200 MHz.

af. Adjust A2R28 to center the marker on the oscilloscope X-axis graticule.

ag. Repeat steps g through q and w through af.

5.4.6 Amplitude Calibration.

HIGH BAND SAMPLER. The following procedure adjusts the gain of the times two amplifier at the output of the Band 2/Band 3 directional detector, used for internal leveling:

a. Set the BAND SELECT switch to Band 2 (571A-2) or Band 3 (571A-1 and 571B).

b. Terminate the RF OUT connector in a suitable 50 Ω load.

c. Adjust the F_c/CW control for mid-band.

d. Locate Sampler A1DC2 (refer to Figure 1.1). Connect the voltmeter probes to the output and ground terminals of A1DC2.

e. Depress and latch the RETRACE switch.

f. Depress and latch the LEVELING OFF switch.

g. Adjust the POWER control for a voltmeter reading of ≈ 50 mV (this corresponds to an RF output of ≈ 10 mW.

h. Move one of the voltmeter leads to terminal E5 on printed circuit assembly A1. Leave the other voltmeter lead attached to the ground terminal of A1DC2.

i. Adjust A1R11 (Figure 5.1) for a voltmeter reading of 100 mV.

DETECTOR TRACKING. The following procedure aligns the outputs of the Band 1 and Band 2/Band 3 leveling circuits:

a. Set the BAND SELECT switch to Band 4.

b. Press and release the RETRACE switch.

c. Depress and latch the SWEEP MODE CW switch.

d. Adjust the F_C/CW control so the indicator is at 900 MHz.

e. Depress and latch the INT LEVELING switch.

f. Connect a power meter to the RF OUT connector; use a 10 dB attenuator in the line or set the optional internal attenuator to 10 dB.

g. Adjust the POWER control for a power meter reading of -1 dBm (this accounts for the presence of the 10 dB attenuator).

h. Without disturbing the setting of the POWER control, disconnect the power meter from the output of the attenuator.

NOTE

Do not disconnect the power meter if a Systron Donner 4020A is used. Instead, follow the instructions within (parentheses) in steps i through r.

i. Attach a crystal detector to the output of the attenuator. (Set the 4020A OUTPUT LEVEL switch to 1 DB/V.)

j. Connect a cable from the output of the crystal detector to the Y-axis input of the oscilloscope. (Connect a cable from the 4020A OUTPUT connector to the Y-axis input of the oscilloscope.)

k. Be sure the crystal detector is loaded with the manufacturer's recommended load resistance for optimum square-law response.

l. Adjust the F2-STOP control so the indicator is at 1100 MHz.

m. Depress and latch the SWEEP MODE F1-F2 switch.

n. Adjust the oscilloscope as necessary and note the dc level of the detector output. (Adjust the 4020A OFFSET control to set the trace to a reference line.)

o. Adjust the POWER control so the dc voltage level is reduced to slightly less than 25% of the level noted in step n. (Adjust the POWER control to effect a 6 dB reduction in output amplitude.)

p. Adjust A2R108 (Figure 5.2) to minimize the observed voltage transition at the band crossover point.

q. Increase the RF output amplitude to the level observed in step n.

r. Adjust A2R106 (Figure 5.2) to minimize the observed voltage transition at the band crossover point.

s. A2R108 and A2R106 interact; repeat steps n through r until optimum tracking has been set.

5.5 TROUBLE ISOLATION AND REPAIR

5.5.1 Initial Checks. In the event of apparent malfunction of the plug-in, several steps must be undertaken in logical sequence to isolate the cause with the least difficulty and down-time.

It is imperative that all mainframe and plug-in control settings be checked to ensure that they have been set correctly for the operating modes desired. For example, the MODULATION MODE RF OFF switch will completely attenuate the RF output of the plug-in. If this switch were accidentally depressed, the plug-in would appear to have failed.

Once satisfied that the control settings and all external measuring equipment have been checked, the RF plug-in must be removed from the mainframe so that the mainframe alone may be checked for correct operation. If the mainframe is operating correctly, check all control settings again then install the plug-in in the mainframe.

Check the voltage levels at the interface connector and throughout the plug-in. The interconnect schematic diagram in Section 6 lists the voltage levels at the interface connector pins. For further investigation, the voltages measured at various points in the plug-in should be close to those listed below:

a. Oscillator Y1 bias, -20 VDC

b. Oscillator Y2 bias, about +20 VDC

c. Oscillator Y2 heater, +20 VDC

d. Oscillator Y2 modulation; -1 V on, ≈+ 5 V off

e. Oscillator Y3 bias, + 15 VDC

f. Oscillator Y3 heater, +15 VDC

g. Oscillator Y3 modulation; -1 V on, ≈+ 5 V off

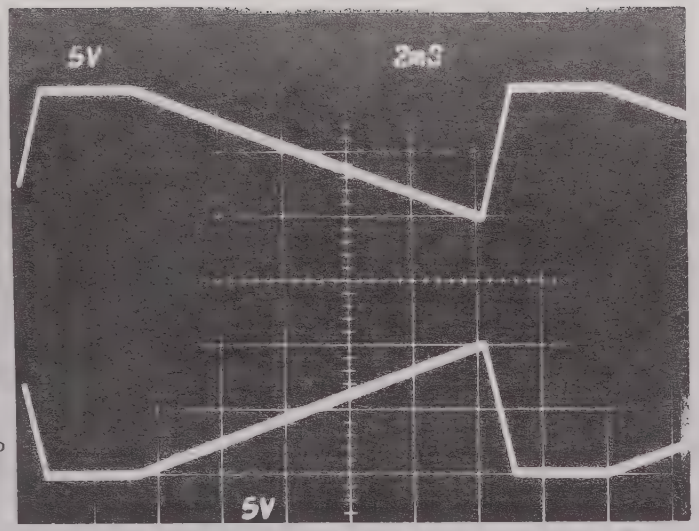
h. Amplifier/Sampler A1R1 bias, +30 VDC

i. RF Switch; +7 V on, ≈ 0 V off

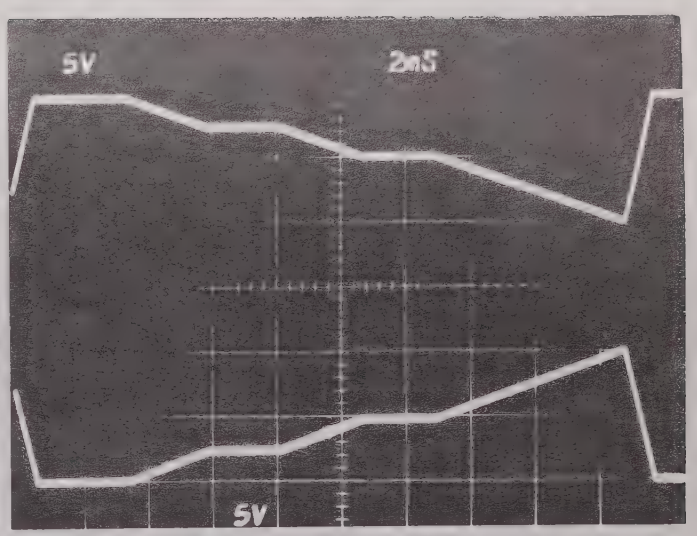
Standard troubleshooting techniques should be used to locate defective components. In addition to the schematic diagrams in Section 6, the block diagrams in Section 4 and the waveforms of Figure 5.3 are included to show the functions of properly-operating circuits. Refer to Figure 5.5 in the instruction manual for the mainframe for semiconductor basing diagrams.

5.5.2 Repair. Repair of the plug-in is limited to location and replacement of defective components or subassemblies. No attempt should be made to repair oscillator modules or or sealed units as the warranty on these units will be made void.

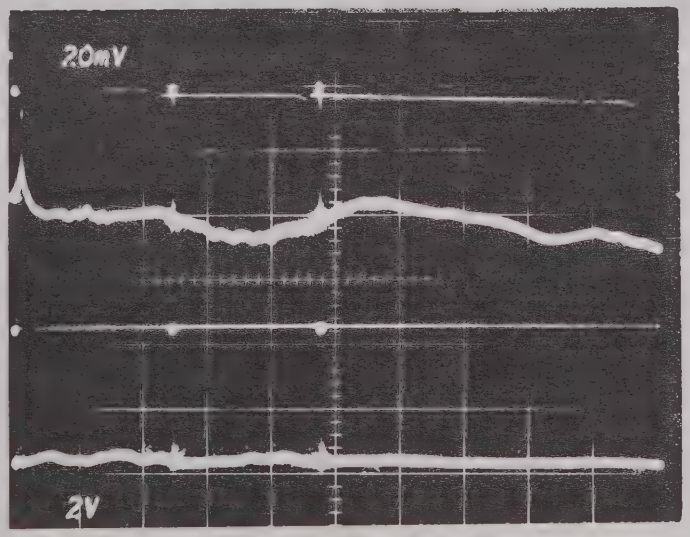
To avoid damage to the printed circuit boards and precision components, solder or remove components with a low-power (25 to 35 W, 500 to 600° F) soldering iron. Do not use soldering guns or large soldering irons. Use only 60-40 or 63-37 rosin core solder. To remove multi-lead devices, use a special iron tip that unsolders all leads at the same time, or cut the device's leads off, discard the device, and clean out the board holes with a vacuum de-soldering device.



BAND 1, 2, OR 3



BAND 4

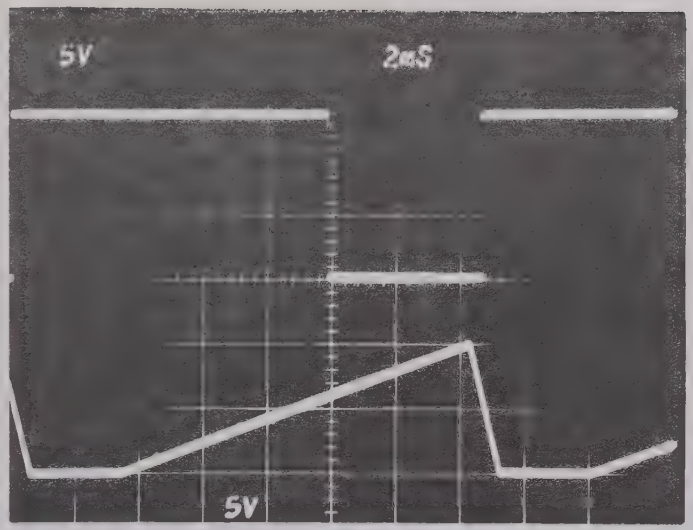


BAND 4

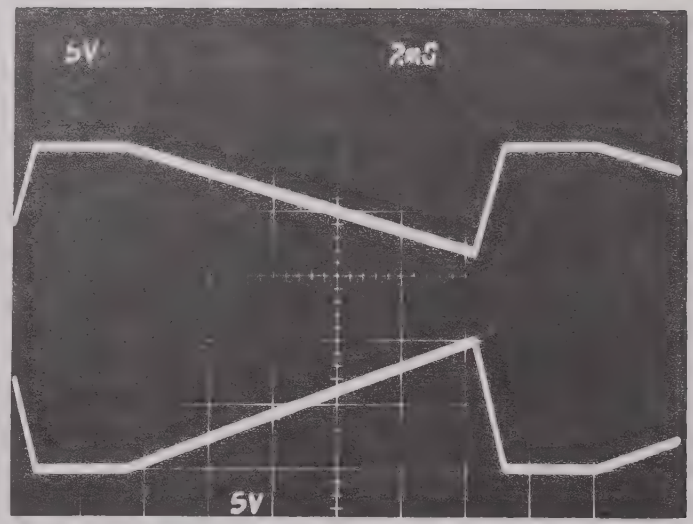
WAVEFORM CONDITIONS

BAND SELECT: As Shown Below Photograph
SWEEP MODE: F1-F2
SWEEP TRIGGER: Internal
SWEEP SPEED: Fast
F1-START: Maximum CCW
F2-STOP: Maximum CW
RETRACE: On
MODULATION MODE: CW
LEVELING: Internal
OSCILLOSCOPE: Tektronix 7504, 7A18 (two), 7B51, 7B50
'SCOPE TRIGGER: Sweep

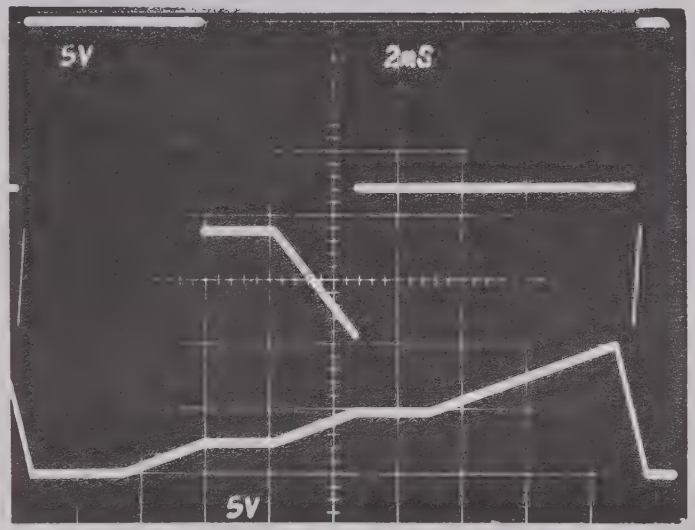
Figure 5.3 Waveforms (Sheet 1 of 5)



BAND 1



BAND 2

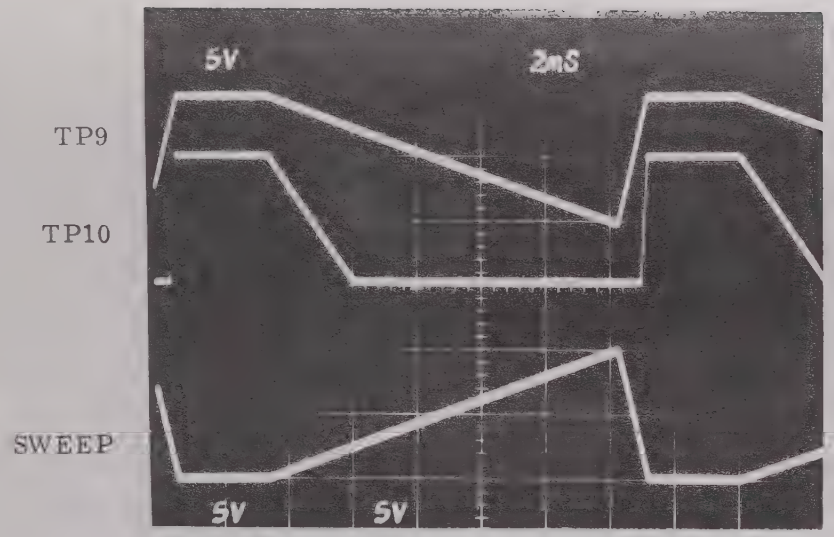


BAND 4

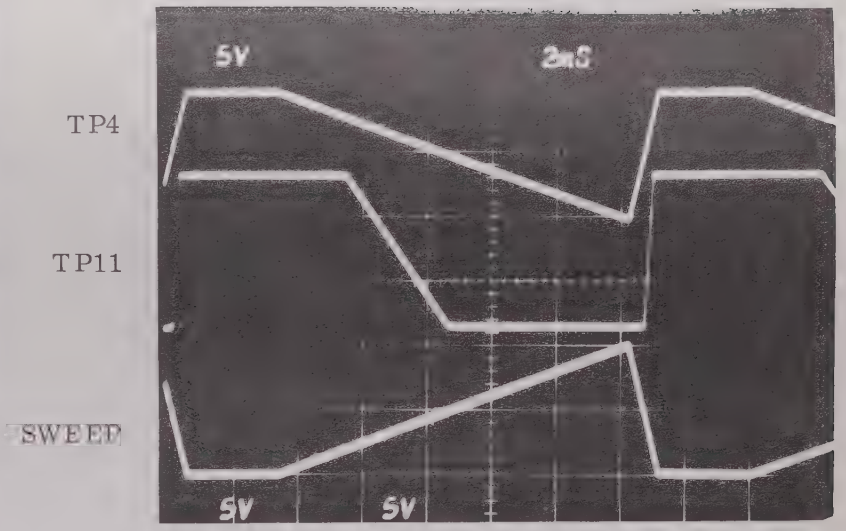
WAVEFORM CONDITIONS

BAND SELECT: As Shown Below Photograph
SWEEP MODE: F1-F2
SWEEP TRIGGER: Internal
SWEEP SPEED: Fast
F1-START: Maximum CCW
F2-STOP: Maximum CW
RETRACE: On
MODULATION MODE: CW
LEVELING: Internal
OSCILLOSCOPE: Tektronix 7504, 7A18 (two), 7B51, 7B50
'SCOPE TRIGGER: Sweep

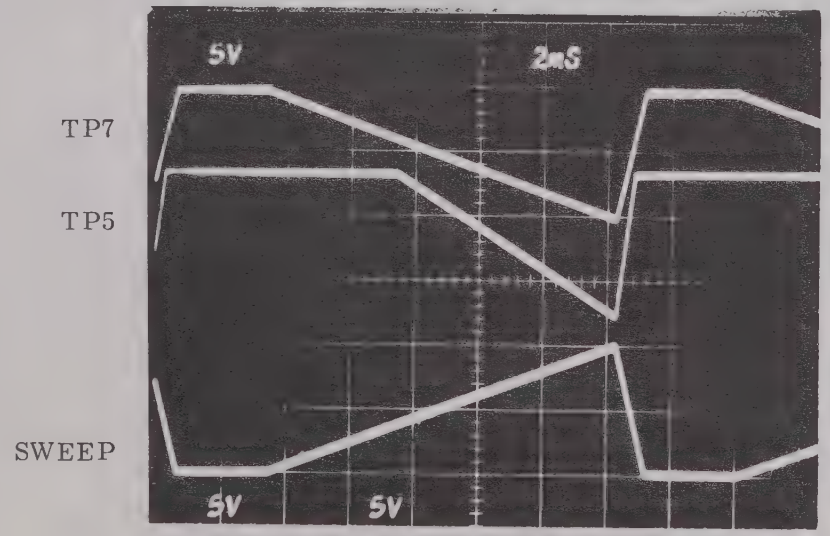
Figure 5.3 Waveforms (Sheet 2 of 5)



BAND 1



BAND 2

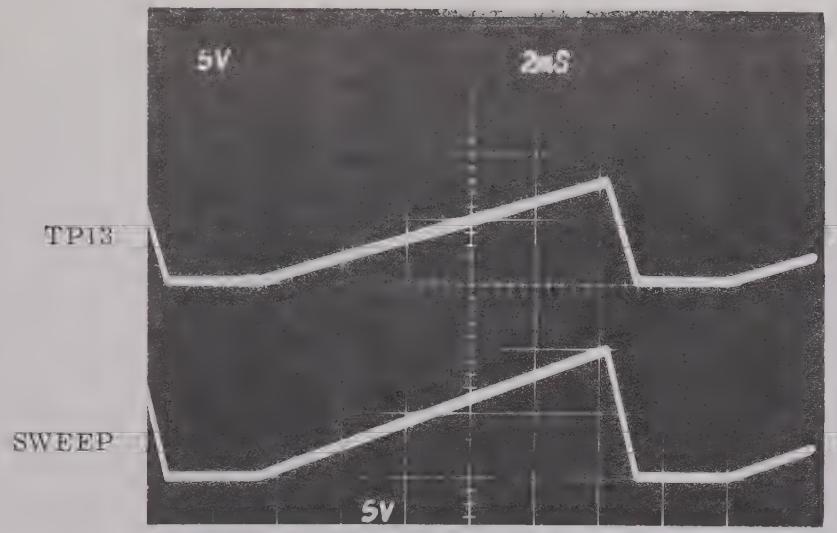


BAND 3

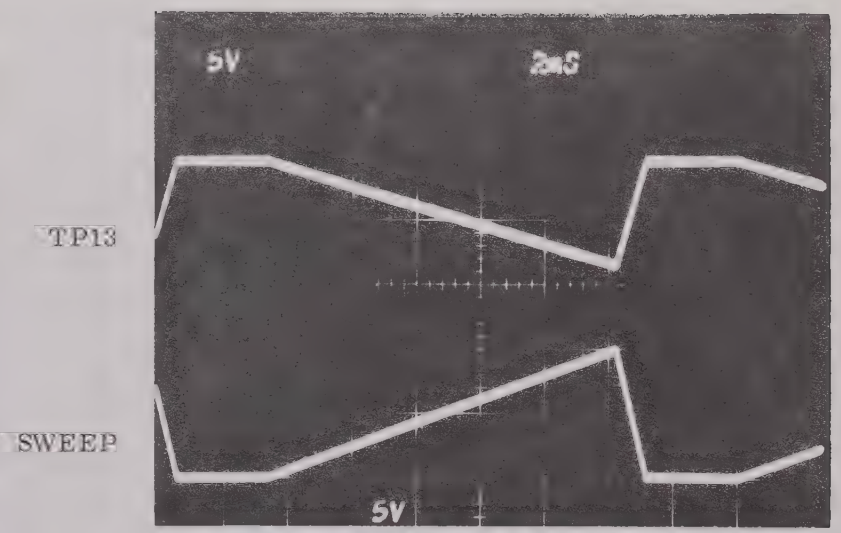
WAVEFORM CONDITIONS

BAND SELECT: As Shown Below Photograph
SWEEP MODE: F1-F2
SWEEP TRIGGER: Internal
SWEEP SPEED: Fast
F1-START: Maximum CCW
F2-STOP: Maximum CW
RETRACE: On
MODULATION MODE: CW
LEVELING: Internal
OSCILLOSCOPE: Tektronix 7504, 7A18 (two), 7B51, 7B50
'SCOPE TRIGGER: Sweep

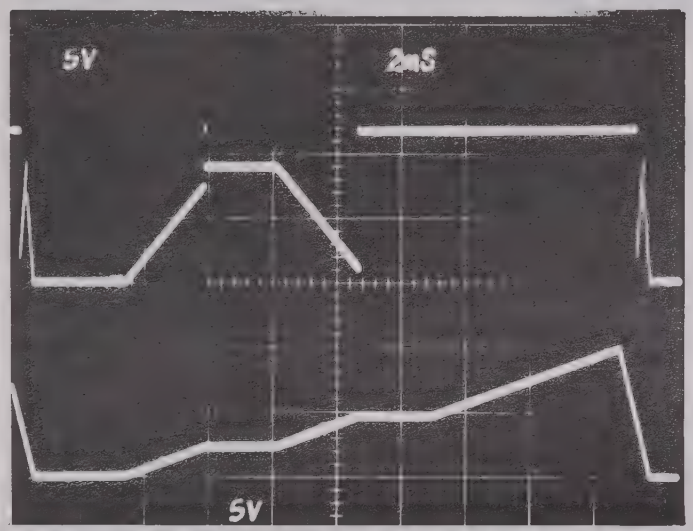
Figure 5.3 Waveforms (Sheet 3 of 5)



BAND 1



BAND 2

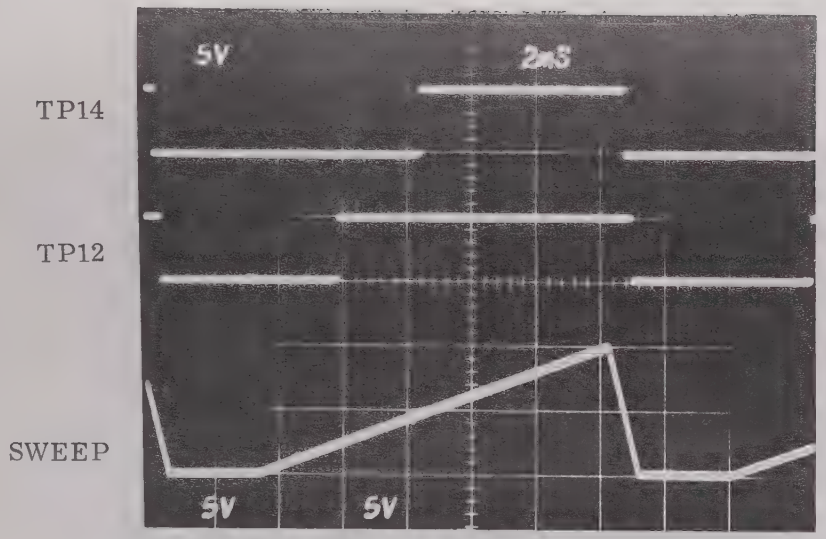


BAND 4

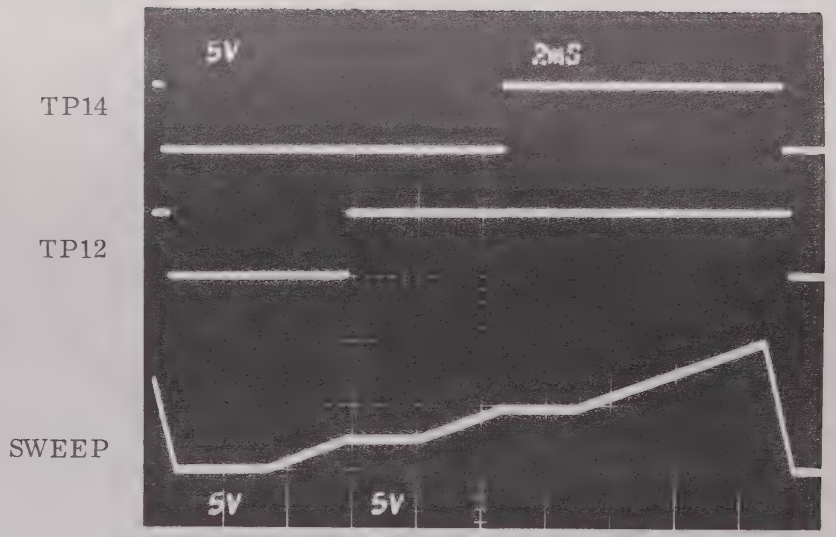
WAVEFORM CONDITIONS

BAND SELECT: As Shown Below Photograph
SWEEP MODE: F1-F2
SWEEP TRIGGER: Internal
SWEEP SPEED: Fast
F1-START: Maximum CCW
F2-STOP: Maximum CW
RETRACE: On
MODULATION MODE: CW
LEVELING: Internal
OSCILLOSCOPE: Tektronix 7504, 7A18 (two), 7B51, 7B50
'SCOPE TRIGGER: Sweep

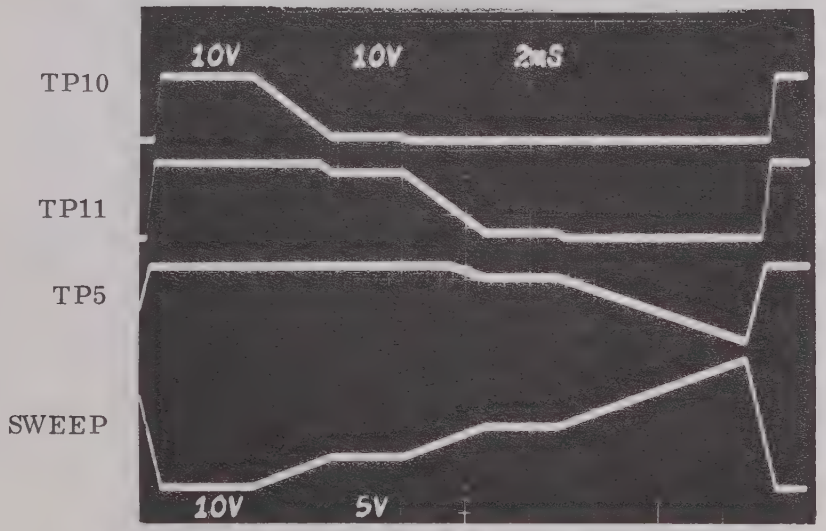
Figure 5.3 Waveforms (Sheet 4 of 5)



BAND 1, 2, OR 3



BAND 4



BAND 4

WAVEFORM CONDITIONS

BAND SELECT: As Shown Below Photograph
SWEEP MODE: F1-F2
SWEEP TRIGGER: Internal
SWEEP SPEED: Fast
F1-START: Maximum CCW
F2-STOP: Maximum CW
RETRACE: On
MODULATION MODE: CW
LEVELING: Internal
OSCILLOSCOPE: Tektronix 7504, 7A18 (two), 7B51, 7B50
'SCOPE TRIGGER: Sweep

Figure 5.3 Waveforms (Sheet 5 of 5)

SECTION 6

DRAWINGS AND PARTS LISTS

6.1 PARTS LISTS

Parts lists for Model 571A and 571B Plug-ins are arranged in the following order:

571A/571B Chassis Electronic Parts List	Page 6-2
A1 (RF Subassembly) P. C. Board Assembly Parts List	Page 6-3
A2 (Mother Board) P. C. Board Assembly Parts List	Page 6-5
A3 (Connector) P. C. Board Assembly Parts List	Page 6-14
A4 (YIG Driver, Bands 1 and 2) P. C. Board Assembly Parts List	Page 6-15
A5★ (YIG Driver, Band 3) P. C. Board Assembly Parts List	Page 6-18
Non-Structural Mechanical Parts List	Page 6-21

6.2 DRAWINGS

Schematic diagrams and parts location drawings (loading diagrams) for the Model 571A and 571B RF Plug-in are arranged in the following order:

A4 and A5★ (YIG Driver Boards) Schematic Diagram	Dwg. No. C900500
A4 and A5★ (YIG Driver Boards) Parts Location	Dwg. No. C946305
A3 (Connector Board) Parts Location	Dwg. No. C946304
A1 (RF Subassembly) Schematic Diagram	Dwg. No. D900498
A1 (RF Subassembly) Parts Location	Dwg. No. D948483
A2 (Mother Board) Schematic Diagram	Dwg. No. D900497
A2 (Mother Board) Parts Location	Dwg. No. D946303
Interconnect Diagram	Dwg. No. D900496

6.3 REPLACEMENT PARTS

Most parts used in the Model 571A/571B are standard distributor items and should be available locally. To order replacement parts which are not otherwise obtainable, write to Systron-Donner Service Division, 935 Detroit Avenue, Concord, CA 94518. Be sure to include the model (571A-1, 571B, or 571A-2) and serial number of the unit for which the parts are ordered. Also be sure to include a description and part number of the part(s) required.

★ Used on 571A-1 and 571B only.

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A1	RF SUBASSEMBLY	948483	▲	
A2	P.C. BOARD ASSEMBLY, Mother Board	946303	▲	
A3	P.C. BOARD ASSEMBLY, Connector Board	946304	▲	
A4	P.C. BOARD ASSEMBLY, YIG Driver (Bands 1 & 2)	946305-1	▲	
A5★	P.C. BOARD ASSEMBLY, YIG Driver (Band 3)	946305-2	▲	
CR1	LAMP, LED	390005	Monsanto	MV-5022
J10*	CONNECTOR, BNC, Isolated	210157	Kings	KC 79-67
J11*	CONNECTOR, BNC, UG-1094/U (Astroplate®)	210011	Amphenol	31-221-1050
J12*	CONNECTOR, BNC, UG-1094/U (Astroplate®)	210011	Amphenol	31-221-1050
J14	CONNECTOR, BNC, Isolated	210157	Kings	KC-79-67
P2	CABLE ASSY, Connector Board to Mother Board	965037	▲	
P3	CABLE ASSY, Connector Board to RF Board	956038	▲	
P4	CABLE ASSY, Connector Board to RF Board	956038	▲	
P5	CABLE ASSY, RF Board to Mother Board	956036	▲	
P6	CABLE ASSY, Connector Board to Mother Board	956037	▲	
P7	CABLE ASSY, RF Board to Mother Board	956036	▲	
P9	CABLE ASSY, Front Panel to Mother Board	965034	▲	
Q1*	TRANSISTOR, 2N5190	485059	Motorola	2N5190
Q2*	TRANSISTOR, 2N5190	485059	Motorola	2N5190
R1*	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
R2*	POTENTIOMETER, 10K, ±10% (5/8" Shaft)	479520	Allen-Bradley	WA1G040P103UA
R3	POTENTIOMETER, 10K, ±10%	479520	Allen-Bradley	WA1G040P103UA
R4	RESISTOR, 22Ω, 1/8W, ±5%	470704	Corning	CL3
R5	POTENTIOMETER, 10K, ±10% (Slotted Shaft)	479521	Allen-Bradley	WA1G0125103UA
S1*	SWITCH, Slide, DPDT	510023	Stackpole	SS-50
W1*	HARNESS, Rear Panel to Mother Board	965035	▲	

★571A-1 or 571B

▲Available only from Systron-Donner

*Part of Rear Panel Assembly #948486

571A/571B CHASSIS ELECTRONIC PARTS LIST (Sheet 1 of 1)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A1AR1	AMPLIFIER/SAMPLER	948480	▲	
A1C1	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A1C2	CAPACITOR, Mica, 33pF, 500V	155472	Elmenco	DM15-330J
A1C3	CAPACITOR, Mica, 5pF, 500V	155460	Elmenco	DM15-050K
A1C4	CAPACITOR, Tantalum, 22uF, 25V	154003	Sprague	196D226X0020FB
A1C5	CAPACITOR, Tantalum, 22μF, 25V	154003	Sprague	196D226X0020FB
A1CR1	DIODE, 1N4446	480004	Fairchild	1N4446
A1DC1	ASSEMBLY, Coupler, 0.97-2.3 GHz	948481	▲	
A1DC2	ASSEMBLY, Sampler	948498	▲	
A1FL1	FILTER, Low Pass, 1 GHz	270002	Wavecom	LL1000
A1J4	SOCKET, IC, 14 Pin	219003	Tex. Inst.	C7 51900
A1J5	SOCKET, IC, 24 Pin, Low Profile	210129	Augat	1N/524-AG1D
A1MT1	MIXER, Double-Balanced	110010	Relcom (WJ)	M1K
A1R1	RESISTOR, WW, 10Ω, 5W, ±1%	477163	Dale	RH-5
A1R2	RESISTOR, WW, 10Ω, 5W, +1%	477163	Dale	RH-5
A1R3	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4
A1R4	RESISTOR, MF, 1.5K, 1/4W, ±2%	471436	Corning	CL4
A1R5	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A1R6	Not used			
A1R7	Not used			
A1R8	RESISTOR, MF, 510Ω, 1/4W, ±2%	471425	Corning	Cl4
A1R9	Not used			
A1R10	RESISTOR, MF, 5.1K, 1/4W, ±2%	471449	Corning	CL4
A1R11	POTENTIOMETER, 5K	479514	IRC	300-5K (Top Adj)
A1S1	SWITCH, Solid State	948485	▲	

A1 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 1 of 2)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A1U1	INTEGRATED CIRCUIT, Op. Amp., LM318H	480674	Nat. Semi.	LM318H
A1VR1	DIODE, Zener, 1N5239	480009	Motorola	1N5239
A1VR2	DIODE, Zener, 10V, 1N5240	480062	Motorola	1N5240
A1VR3	DIODE, Zener, 24V, 1N4249	480006	Dickson	1N4249A
A1VR4	DIODE, Zener, 10V, 1N5240	480062	Motorola	1N5240
A1Y1	OSCILLATOR, Local	948484	▲	
A1Y2	OSCILLATOR, YIG-Tuned, 1-2.2 GHz	110118	Omni Yig▲	YOL 36 Spec. #A453
A1Y3★	OSCILLATOR, YIG-Tuned, 1.65-4.25 GHz	110113	ESC	303-37
A1X	P.C. BOARD Only	936302	▲	
	BRACKET, Mixer Mounting	922310	▲	
	BRACKET, Oscillator Mounting	922309	▲	
	BRACKET, RF Connector Mounting	922298	▲	
	CABLE ASSY, Amplifier/Sampler to RF Switch	948494	▲	
	CABLE ASSY, Coupler to Mixer	948492	▲	
	CABLE ASSY, Coupler to Oscillator	948491	▲	
	CABLE ASSY, Coupler to RF Switch	948493	▲	
	CABLE ASSY, Filter to Mixer	948490	▲	
	CABLE ASSY, Local Oscillator to Mixer	948489	▲	
	CABLE ASSY, Output	948487	▲	
	CABLE ASSY, RF Switch to Sampler	948488	▲	
	CONNECTOR, Pin	210130	AMP	60753-1
	CONNECTOR, Receptacle	210131	AMP	60986-1
	HEAT DUCT	922297	▲	

★571A-1 or 571B

A1 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 2 of 2)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2C1	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C2	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C3	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C4	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C5	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C6	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C7	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C8	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
\	\	\	\	\
A2C12	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C13	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C14	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C15	CAPACITOR, Tantalum, 22μF, 25V	154003	Sprague	196D226X0020FB
A2C16	CAPACITOR, Tantalum, 22μF, 25V	154003	Sprague	196D226X0020FB
A2C17	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C18	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C19	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C20	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C21	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C22	CAPACITOR, Mica, 10pF, 500V, ±5%	155462	Elmenco	DM15-100J
A2C23	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C24	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C25	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C26	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C27	CAPACITOR, Mica, 10pF, 500V, ±5%	155462	Elmenco	DM15-100J
A2C28	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C29	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C30	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C31	CAPACITOR, Mylar, .001μF, 500V	150009	Erie	801-000-X5F0-102K
A2C32	CAPACITOR, Tubular, 2.2pF, 1600V	150526	Sprague	10 TCC-V22
A2C33	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C34	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C35	CAPACITOR, Tubular, 2.2pF, 1600V	150526	Sprague	10 TCC-V22
A2C36	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10

A2 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 1 of 10)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2C37	CAPACITOR, Monoblock, .1μF, 100V, ±10%	150920	Eric	8133-000-W5R20-104K
A2C38	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A2C39	CAPACITOR, Mica, 56pF, 500V, ±5% (Selected at test)	155478	Elmenco	DM15-560J
A2C40	CAPACITOR, Mica, 100pF, 500V, ±5%	155490	Elmenco	DM15-101J
A2C41	CAPACITOR, Mica, 100pF, 500V, ±5%	155490	Elmenco	DM15-101J
A2C42	CAPACITOR, Mica, 5pF, 500V, ±5%	155460	Elmenco	DM15-050K
A2C43	CAPACITOR, Mica, 120pF, 500V, ±5%	155493	Elmenco	DM15-121J
A2C44	CAPACITOR, Mica, 27pF, 500V, ±5%	155470	Elmenco	DM15-270J
A2C45	CAPACITOR, Electrolytic, 50μF, 50V	152410	Sprague	TE1307
A2CR1	DIODE, Germanium, 1N277	480074	Motorola	1N277
A2CR2	DIODE, Silicon, 1N4005	480003	Dickson	1N4005
A2CR3	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
thru		thru	thru	thru
A2CR7	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR8	DIODE, Silicon, 1N4005	480003	Dickson	1N4005
A2CR9	Not used			
A2CR10	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR11	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR12	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR13	DIODE, Silicon, Triple, STB 569	480039	General Electric	STB 569
A2CR14	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
thru		thru	thru	thru
A2CR25	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR26	DIODE, Silicon, Triple, STB 569	480039	General Electric	STB 569
A2CR27	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR28	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR29	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR30	Not used			
A2CR31	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
thru		thru	thru	thru
A2CR34	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR35	DIODE, Silicon, 1N4006	480003	Dickson	1N4005
A2CR36	DIODE, Silicon, Dual, STB 567	480037	General Electric	STB 567
A2CR37	DIODE, Silicon, Dual, STB 567	480037	General Electric	STB 567

REF	DESCRIPTION	P/N	MFR.	MFR. P/N
A2CR38	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR43	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2CR44	DIODE, Silicon, 1N4005	480003	Dickson	1N4005
A2CR45	DIODE, Silicon, 1N4005	480003	Dickson	1N4005
A2CR46	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A2J1	CONNECTOR, PC, 30 Pin	210214	Masterite	DSO14ALIS-DR-H-AY
A2J2	CONNECTOR, PC, 30 Pin	210214	Masterite	DSO14ALIS-DR-H-AY
A2J3	Not used			
A2J4	Not used			
A2J5	Not used			
A2J6	CONNECTOR, IC Socket, 24 Pin, Low Profile	210129	Augat	1N/524-AG1D
A2J7	CONNECTOR, IC Socket, 24 Pin, Low Profile	210129	Augat	1N/524-AG1D
A2J8	CONNECTOR, IC Socket, 14 Pin	210003	Star	91737
A2J9	CONNECTOR, IC Socket, 14 Pin	210003	Star	91737
	SOCKET, IC (7 Pin Terminal Strip)	219007	Molex	1938-4B-7
	INSULATOR, IC Socket (7 Holes)	219008	Molex	06-05-3071
A2K1	RELAY, Form A, 24V	450012	Babcock	10A1N-AA24
A2K2	RELAY, Form A, 24V	450012	Babcock	10A1N-AA24
A2K3	RELAY, Form A, 24V	450012	Babcock	10A1N-AA24
A2Q1	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A2Q4	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A2Q5	TRANSISTOR, PNP, Silicon, 2N5087	485040	Motorola	2N5087
A2Q6	TRANSISTOR, PNP, Silicon, 2N5087	485040	Motorola	2N5087
A2Q7	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A2Q8	TRANSISTOR, PNP, Silicon, 2N5087	485040	Motorola	2N5087
A2Q9	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A2Q10	TRANSISTOR, NPN, Silicon, 2N2102	485004	RCA	2N2102
A2Q11	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A2Q14	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391

A2 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 3 of 10)

REF.	DESCRIPTION	P/N	MFR	MFR P/N
A2Q15	TRANSISTOR, NPN, Silicon, 2N2102	485004	RCA	2N2102
A2Q16	TRANSISTOR, NPN, Silicon, 2N2102	485004	RCA	2N2102
A2Q17	TRANSISTOR, NPN, Silicon, 2N2102	485004	RCA	2N2102
A2Q18	TRANSISTOR, PNP, Silicon, 2N5087	485040	Motorola	2N5087
A2Q19	TRANSISTOR, PNP, Silicon, 2N5087	485040	Motorola	2N5087
A2Q20	TRANSISTOR, PNP, Silicon, 2N4314	485029	RCA	2N4314
	TRANSISTOR PAD	480752	Birnbach	BHS-5 TO-5
A2R1	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R2	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R3	RESISTOR, MF, 30K, 1/4W, ±2%	471467	Corning	CL4
A2R4	RESISTOR, MF, 24K, 1/4W, ±2%	471465	Corning	CL4
A2R5	RESISTOR, MF, 24K, 1/4W, ±2%	471465	Corning	CL4
A2R6	RESISTOR, MF, 12K, 1/4W, ±2%	471458	Corning	CL4
A2R7	RESISTOR, MF, 2Ω, 1/4W, ±2%	470671	IRC	TF-07
A2R8	RESISTOR, MF, 100Ω, 1/4W, ±2%	471408	Corning	CL4
A2R9	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R10	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R11	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4
A2R12	RESISTOR, MF, 6.8K, 1/4W, ±2%	471452	Corning	CL4
A2R13	POTENTIOMETER, 10K	479515	IRC	300-10K (Top Adj)
A2R14	RESISTOR, MF, 100Ω, 1/4W, ±2%	471408	Corning	CL4
A2R15	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R18	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R19■	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4
A2R20	RESISTOR, Comp, 1M, 1/4W, ±10%	475678		
A2R21	RESISTOR, MF, 9.1K 1/4W, ±2%	471455	Corning	CL4
A2R22	RESISTOR, MF, 43K, 1/4W, ±2%	471471	Corning	CL4
A2R23	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R24	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R25	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R26	POTENTIOMETER, 10K	479515	IRC	300-10K (Top Adj)
A2R27	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4

A2 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 4 of 10)

■See page 6-14

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2R28	POTENTIOMETER, 1K	479510	IRC	300-1K V
A2R29	RESISTOR, MF, 5.1K, 1/4W, ±2%	471449	Corning	CL4
A2R30	RESISTOR, MF, 2Ω, 1/4W, ±2%	470671	IRC	TF-07
A2R31	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R32	RESISTOR, MF, 20K, 1/4W, ±2%	471463	Corning	CL4
A2R33	RESISTOR, MF, 20K, 1/4W, ±2%	471463	Corning	CL4
A2R34	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R35	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R36	RESISTOR, MF, 3.9K, 1/4W, ±2%	471446	Corning	CL4
A2R37	RESISTOR, MF, 12K, 1/4W, ±2%	471458	Corning	CL4
A2R38■	RESISTOR, Comp, 10M, 1/4W, ±10%	475693		
A2R39	RESISTOR, MF, 22K, 1/4W, ±2%	471464	Corning	CL4
A2R40	RESISTOR, MF, 16K, 1/4W, ±2%	471461	Corning	CL4
A2R41	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R44	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R45	RESISTOR, MF, 7.5K, 1/4W, ±2%	471453	Corning	CL4
A2R46	POTENTIOMETER, 500Ω, 5W, 1 Turn	479559	IRC	300-500Ω (Top Adj)
A2R47■	RESISTOR, MF, 2.4K, 1/4W, ±2%	471441	Corning	CL4
A2R48	RESISTOR, MF, 36K, 1/4W, ±2%	471469	Corning	CL4
A2R49	POTENTIOMETER, 5K	479514	IRC	300-5K (Top Adj)
A2R50	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4
A2R51	POTENTIOMETER, 10K	479515	IRC	300-10K (Top Adj)
A2R52	RESISTOR, MF, 2.7K, 1/4W, ±2%	471442	Corning	CL4
A2R53	RESISTOR, MF, 5.6K, 1/4W, ±2%	471450	Corning	CL4
A2R54	RESISTOR, MF, 24K, 1/4W, ±2%	471465	Corning	CL4
A2R55	RESISTOR, Comp, 1M, 1/4W, ±10%	475678		
A2R56■	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4
A2R57	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R58	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4
A2R59	POTENTIOMETER, 5K	479514	IRC	300-5K (Top Adj)
A2R60	RESISTOR, MF, 6.8K, 1/4W, ±2%	471452	Corning	CL4
A2R61	RESISTOR, Comp, 1M, 1/4W, ±10%	475678		
A2R62	POTENTIOMETER, 10K	479515	IRC	300-10K (Top Adj)

A2 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 5 of 10)

■ See page 6-14

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2R63	RESISTOR, MF, 30K, 1/4W, ±2%	471467	Corning	CL4
A2R64	RESISTOR, MF, 12K, 1/4W, ±2%	471458	Corning	CL4
A2R65	POTENTIOMETER, 500Ω, 5W, 1 Turn	479559	IRC	300-500Ω (Top Adj)
A2R66■	RESISTOR, MF, 1.5K, 1/4W, ±2%	471436	Corning	CL4
A2R67	RESISTOR, MF, 62K, 1/4W, ±2%	471475	Corning	CL4
A2R68	RESISTOR, Comp, 1M, 1/4W, ±10%	475678		
A2R69	RESISTOR, Comp, 820K, 1/4W, ±10%	475677		
A2R70	RESISTOR, MF, 36K, 1/4W, ±2%	471469	Corning	CL4
A2R71	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R72■	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R73	RESISTOR, MF, 39K, 1/4W, ±2%	471470	Corning	CL4
A2R74	POTENTIOMETER, 1K	479510	IRC	300-1K V
A2R75■	RESISTOR, MF, 9.1K, 1/4W, ±2%	471455	Corning	CL4
A2R76■	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R77	RESISTOR, MF, 5.6K, 1/4W, ±2%	471450	Corning	CL4
A2R78	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R79	POTENTIOMETER, 5K	479514	IRC	300-5K (Top Adj)
A2R80	RESISTOR, MF, 27K, 1/4W, ±2%	471466	Corning	CL4
A2R81	RESISTOR, MF, 13K, 1/4W, ±2%	471459	Corning	CL4
A2R82	POTENTIOMETER, 5K	479514	IRC	300-5K (Top Adj)
A2R83	RESISTOR, MF, 6.8K, 1/4W, ±2%	471452	Corning	CL4
A2R84	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R85	RESISTOR, Comp, 470K, 1/4W, ±10%	475661		
A2R86■	RESISTOR, MF, 39K, 1/4W, ±2%	471470	Corning	CL4
A2R87	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R88	RESISTOR, MF, 12K, 1/4W, ±2%	471458	Corning	CL4
A2R89	RESISTOR, MF, 2.2K, 1/4W, ±2%	471440	Corning	CL4
A2R90	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R91	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R92	RESISTOR, MF, 9.1K, 1/4W, ±2%	471455	Corning	CL4
A2R93	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R94	RESISTOR, MF, 820Ω, 1/4W, ±2%	471430	Corning	CL4
A2R95	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4
A2R96	RESISTOR, MF, 150Ω, 1/4W, ±2%	471412	Corning	CL4

■ See page 6-14

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2R97	RESISTOR, MF, 9.1K, 1/4W, ±2%	471455	Corning	CL4
A2R98	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4
A2R99	RESISTOR, MF, 820Ω, 1/4W, ±2%	471430	Corning	CL4
A2R100	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R101	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R102	RESISTOR, MF, 91K, 1/4W, ±2%	471479	Corning	CL4
A2R103	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R104	RESISTOR, MF, 91K, 1/4W, ±2%	471479	Corning	CL4
A2R105	RESISTOR, MF, 33K, 1/4W, ±2%	471468	Corning	CL4
A2R106	POTENTIOMETER, 20K, 1/2W, ±10%	475739		
A2R107	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A2R108	POTENTIOMETER, 10K	479515	IRC	300-10K (Top Adj)
A2R109	RESISTOR, MF, 68K, 1/4W, ±2%	471476	Corning	CL4
A2R110	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R111	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R112	RESISTOR, MF, 120K, 1/4W, ±2%	471482	Corning	CL4
A2R113	RESISTOR, MF, 120K, 1/4W, ±2%	471482	Corning	CL4
A2R114	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R115	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R116	RESISTOR, MF, 43K, 1/4W, ±2% (Selected at test)			
A2R117	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R118	RESISTOR, MF, 18K, 1/4W, ±2% (Selected at test)			
A2R119	RESISTOR, Comp, 470K, 1/4W, ±10% (Selected at test)			
A2R120	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R121	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R122	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R123	RESISTOR, Select at Test			
A2R124	RESISTOR, Select at Test			
A2R125	RESISTOR, MF, 82K, 1/4W, ±2%	471478	Corning	CL4
A2R126	RESISTOR, MF, 5Ω, 1/4W, ±2%	470673	IRC	TF-07
A2R127	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R128	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R129	RESISTOR, MF, 4.3K, 1/4W, ±2% (Selected at test)			
A2R130	RESISTOR, MF, 4.3K, 1/4W, ±2%	471447	Corning	CL4

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2R131	RESISTOR, MF, 22K, 1/4W, ±2%	471464	Corning	CL4
A2R132	RESISTOR, MF, 100K, 1/4W, ±2%	471480	Corning	CL4
A2R133	RESISTOR, MF, 24K, 1/4W, ±2% (Selected at test)			
A2R134	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R135	Not used			
A2R136	RESISTOR, MF, 5.1K, 1/4W, ±2% (Selected at test)			
A2R137	RESISTOR, MF, 390Ω, 1/4W, ±2%	471422	Corning	CL4
A2R138	RESISTOR, WW, 300Ω, 3W, ±5%	477036	Dale	RS-2B
A2R139	Not used			
A2R140	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R141	RESISTOR, MF, 470Ω, 1/4W, ±2%	471424	Corning	CL4
A2R142	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R151	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R152	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R153	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R154	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R155	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R156	RESISTOR, MF, 15K, 1/4W, ±2%	471460	Corning	CL4
A2R157	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R158	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R159	RESISTOR, MF, 1K, 1/4W, ±2%	471432	Corning	CL4
A2R160	RESISTOR, Comp, 4.7K, 1/4W, ±10%	475662		
A2R161	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R162	RESISTOR, MF, 51Ω, 1/4W, ±2%	471401	Corning	CL4
A2R163	RESISTOR, MF, 51Ω, 1/4W, ±2%	471401	Corning	CL4
A2R164	RESISTOR, MF, 51Ω, 1/4W, ±2%	471401	Corning	CL4
A2R165	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R166	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R167	RESISTOR, MF, 22K, 1/4W, ±2%	471464	Corning	CL4
A2R168	RESISTOR, Comp, 680K, 1/4W, ±10%	475676		
A2R169	RESISTOR, MF, 12K, 1/4W, ±2%	471458	Corning	CL4
A2S1	SWITCH, Pushbutton, 3 Station, 2PDT	510084	IEE (Schadow)	3XF12.5 No Button 2 UGR

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2TP1	TEST POINT, Red	210179	EF Johnson	105-852
\	\	\	\	\
A2TP15	TEST POINT, Red	210179	EF Johnson	105-852
A2U1	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A2U2	INTEGRATED CIRCUIT, Quad NAND Gate, SN7400N	480661	Tex. Inst.	SN7400N
A2U3	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
\	\	\	\	\
A2U13	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A2U14	INTEGRATED CIRCUIT, Hex Inverter, SN7404N	480670	Tex. Inst.	SN7404N
A2U15	INTEGRATED CIRCUIT, 1-Shot, SN74121N	480668	Tex. Inst.	SN74121N
A2U16	INTEGRATED CIRCUIT, 1-Shot, SN74121N	480668	Tex. Inst.	SN74121N
A2U17	INTEGRATED CIRCUIT, Op. Amp., LM318AH	480674	Nat. Semi.	LM318AH
A2U18	INTEGRATED CIRCUIT, Op. Amp., LM318AH	480674	Nat. Semi.	LM318AH
A2U19	INTEGRATED CIRCUIT, Op. Amp., LM318AH	480674	Nat. Semi.	LM318AH
A2U20	INTEGRATED CIRCUIT, SN7451N	480671	Tex. Inst.	SN7451N
A2U21	INTEGRATED CIRCUIT, SN7451N	480671	Tex. Inst.	SN7451N
A2U22	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A2VR1	DIODE, Zener, 4.7V, 1N5230	480030	Motorola	1N5230
A2VR2	DIODE, Zener, 11V, 1N5241B	480054	Motorola	1N5241B
A2VR3	DIODE, Zener, 10V, 1N5240	480062	Motorola	1N5240
A2VR4	DIODE, Zener, 3.9V, 1N5228	480016	Motorola	1N5228
A2VR5	DIODE, Zener, 5.6V, 1N4734A	480005	Dickson	1N4734A
A2VR6	DIODE, Zener, 6.8V, 1N5235A	480019	Motorola	1N5235A
A2VR7	DIODE, Zener, 6.8V, 1N5235A	480019	Motorola	1N5235A

■ Different values are loaded for the following resistors on the A2 board of the 571A-2; all other values are identical for 571A-1, 571B, and 571A-2.

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A2R19	RESISTOR, MF, 39K, 1/4W, ±2%	471470	Corning	CL4
A2R38	RESISTOR, Comp, 5.6M, 1/4W, ±10%	475687		
A2R47	RESISTOR, MF, 12K, 1/4W ±2%	471458	Corning	CL4
A2R56	RESISTOR, MF, 15K, 1/4W ±2%	471460	Corning	CL4
A2R66	RESISTOR, MF, 3.3K, 1/4W, ±2%	471444	Corning	CL4
A2R72	RESISTOR, MF, 9.1K, 1/4W, ±2%	471455	Corning	CL4
A2R75	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A2R76	RESISTOR, MF, 18K, 1/4W, ±2%	471462	Corning	CL4
A2R86	RESISTOR, MF, 30K, 1/4W, ±2%	471467	Corning	CL4

A2 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 10 of 10)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A3J2	SOCKET, IC, 24 Pin, Low Profile	210129	Augat	1N/524-AG1D
A3J3	SOCKET, IC, 14 Pin	219003	Texas Inst.	C7 51900
A3P1	CONNECTOR, 32 Pin (Modified)	960197	▲	
A3X	P.C. BOARD Only	936304	▲	
	CONNECTOR BRACKET	922227	▲	

A3 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 1 of 1)

REF.	DESCRIPTION	P/N	MFR.	MFR P/N
A4C1	CAPACITOR, Mylar, .001μF, 200V	157010	Sprague	192P10292
A4C2	CAPACITOR, Mica, 10pF, 500V, ±5%	155462	Elmenco	DM15-100J
A4C3	CAPACITOR, Selected at Test			
A4C4	CAPACITOR, Mylar, .001μF, 200V	157010	Sprague	192P10292
A4C5	CAPACITOR, Mica, 270pF, 500V	155509	Elmenco	DM15-271J
A4C6	CAPACITOR, Mica, 27pF, 500V	155470	Elmenco	DM15-270J
A4C7	CAPACITOR, Ceramic, .005μF, 100V	150010	Sprague	TG-D-50
A4C8	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A4C9	CAPACITOR, Tantalum, 22μF, 25V	154003	Sprague	196D226X0020FB
A4C10	CAPACITOR, Mica, 10pF, 500V, ±5%	155462	Elmenco	DM15-100J
A4C11	CAPACITOR, Mica, 27pF, 500V	155470	Elmenco	DM15-270J
A4C12	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A4C13	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A4C14	CAPACITOR, Mica, 330pF, 500V	155511	Elmenco	DM15-3315
A4C15	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A4C16	CAPACITOR, Mica, 15pF, 500V, ±5%	155463	Elmenco	DM15-150J
A4C17	CAPACITOR, Mica, 27pF, 500V	155470	Elmenco	DM15-270J
A4C18	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A4C19	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A4CR1	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A4CR2	Not used			
A4CR3	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A4CR4	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A4CR5	Not used			
A4CR6	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A4CR7	DIODE, SCR, 50V, 1.6A, ID200	485015	Unitrode	ID200
A4CR8	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A4CR9	Not used			
A4CR10	DIODE, Silicon, 1N4005	480003	Dickson	1N4005
A4K1	RELAY, Form A, 24V, 10A, 1N-AA24	450012	Babcock	10A1N-AA24

A4 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 1 of 3)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A4Q1	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A4Q2	TRANSISTOR, NPN, Silicon, 2N5190	485059	Motorola	2N5190
A4Q3	TRANSISTOR, NPN, Silicon, 2N2102	485004	RCA	2N2102
A4Q4	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A4Q5	TRANSISTOR, NPN, Silicon, 2N5190	485059	Motorola	2N5190
A4R1	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A4R2	RESISTOR, MF, 6.8K, 1/4W, ±2%	471452	Corning	CL4
A4R3	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4
A4R4	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A4R5	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A4R6	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A4R7	RESISTOR, MF, 4.7K, 1/4W, ±2%	471448	Corning	CL4
A4R8	RESISTOR, MF, 120K, 1/4W, ±2%	471482	Corning	CL4
A4R9	RESISTOR, Comp, 470K, 1/4W, ±10%	475661		
A4R10	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A4R11	RESISTOR, Selected at Test			
A4R12	POTENTIOMETER, 10K, ±10%	479518	IRC	310-10K (Side Adj)
A4R13	RESISTOR, MF, 20K, 1/4W, ±2%	471463	Corning	CL4
A4R14	POTENTIOMETER, 5K, ±10%	479517	IRC	310-5K (Side Adj)
A4R15	RESISTOR, Selected at Test			
A4R16	RESISTOR, MF, 22K, 1/4W, ±2%	471464	Corning	CL4
A4R17	RESISTOR, Comp, 10Ω, 1/4W, ±10%	475601		
A4R18	RESISTOR, MF, 100Ω, 1/4W, ±2%	471408	Corning	CL4
A4R19	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A4R20	RESISTOR, MF, 82K, 1/4W, ±2%	471478	Corning	CL4
A4R21	RESISTOR, MF, 150K, 1/4W, ±2%	471484	Corning	CL4
A4R22	RESISTOR, MF, 5.1K, 1/4W, ±2%	471449	Corning	CL4
A4R23	RESISTOR, MF, 5.1K, 1/4W, ±2%	471449	Corning	CL4
A4R24	RESISTOR, MF, 470Ω, 1/4W, ±2%	471424	Corning	CL4
A4R25	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A4R26	POTENTIOMETER, 1K, ±10%	479508	Allen Bradley	ZH1021
A4R27	RESISTOR, Selected at Test			
A4R28	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4

A4 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 2 of 3)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A4R29	RESISTOR, MF, 1.8K, 1/4W, ±2%	471438	Corning	CL4
A4R30	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A4R31	RESISTOR, Selected at Test			
A4R32	RESISTOR, MF, 18K, 1/4W, ±2%	471462	Corning	CL4
A4R33	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4
A4R34	RESISTOR, MF, 100Ω, 1/4W, ±2%	471408	Corning	CL4
A4R35	RESISTOR, MF, 220Ω, 1/4W, ±2%	471416	Corning	CL4
A4R36	RESISTOR, MF, 4.7K, 1/4W, ±2%	471448	Corning	CL4
A4R37	RESISTOR, Comp, 10Ω, 1/4W, ±10%	475601		
A4R38	RESISTOR, MF, 36K, 1/4W, ±2%	471469	Corning	CL4
A4R39	RESISTOR, MF, 51Ω, 1/4W, ±2%	471401	Corning	CL4
A4R40	RESISTOR, MF, 47K, 1/4W, ±2%	471472	Corning	CL4
A4U1	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A4U2	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A4U3	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A4U4	INTEGRATED CIRCUIT, Op. Amp., LM318H	480674	Nat. Semi.	LM318H
A4U5	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A4VR1	DIODE, Zener, 39V, 1N5259	480076	Motorola	1N5259
A4VR2	DIODE, Zener, 6.2V, 1N827	480011	IRC	1N827
A4VR3	DIODE, Zener, 22V, 1N4748	480061	Motorola	1N4748
A4X	P.C. BOARD Only	936305	▲	
	HEATSINK (Mod.)	928904	▲	

A4 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 3 of 3)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A5C1	CAPACITOR, Mylar, .001μF, 200V	157010	Sprague	192P10292
A5C2	CAPACITOR, Mica, 10pF, 500V, ±5%	155462	Elmenco	DM15-100J
A5C3	CAPACITOR, Selected at Test			
A5C4	CAPACITOR, Mica, 470pF, 500V, ±5%	155515	Elmenco	DM15-471J
A5C5	CAPACITOR, Mica, 270pF, 500V	155509	Elmenco	DM15-271J
A5C6	CAPACITOR, Mica, 27pF, 500V	155470	Elmenco	DM15-270J
A5C7	CAPACITOR, Ceramic, .005μF, 100V	150010	Sprague	TG-D-50
A5C8	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8122-000-W5R0-104K
A5C9	CAPACITOR, Tantalum, 22μF, 25V	154003	Sprague	196D226X0020FB
A5C10	CAPACITOR, Mica, 10pF, 500V, ±5%	155462	Elmenco	DM15-100J
A5C11	CAPACITOR, Mica, 27pF, 500V	155470	Elmenco	DM15-270J
A5C12	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A5C13	CAPACITOR, Ceramic, .01μF, 100V	150100	Sprague	TGS10
A5C14	CAPACITOR, Mica, 330pF, 500V	155511	Elmenco	DM15-3315
A5C15	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A5C16	CAPACITOR, Mica, 15pF, 500V, ±5%	155463	Elmenco	DM15-150J
A5C17	CAPACITOR, Mica, 27pF, 500V	155470	Elmenco	DM15-270J
A5C18	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A5C19	CAPACITOR, Ceramic, .1μF, 100V	150920	Erie	8133-000-W5R0-104K
A5CR1	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A5CR2	Not used			
A5CR3	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A5CR4	DIODE, Silicon, 1N4446	480004	Fairchild	
A5CR5	Not used			
A5CR6	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A5CR7	DIODE, SCR, 50V, 1.6A, ID200	485015	Unitrode	ID200
A5CR8	DIODE, Silicon, 1N4446	480004	Fairchild	1N4446
A5CR9	Not used			
A5CR10	DIODE, Silicon, 1N4005	480003	Dickson	1N4005
A5K1	RELAY, Form A, 24V, 10A, 1N-AA24	450012	Babcock	10A1N-AA24

A5 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 1 of 3)
(Used on 571A-1 and 571B)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A5Q1	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A5Q2	TRANSISTOR, NPN, Silicon, 2N5190	485059	Motorola	2N5190
A5Q3	TRANSISTOR, NPN, Silicon, 2N2102	485004	RCA	2N2102
A5Q4	TRANSISTOR, NPN, Silicon, 2N3391	485006	General Electric	2N3391
A5Q5	TRANSISTOR, NPN, Silicon, 2N5190	485059	Motorola	2N5190
A5R1	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A5R2	RESISTOR, MF, 6.2K, 1/4W, ±2%	471451	Corning	CL4
A5R3	RESISTOR, Comp, 180K, 1/4W, ±10%	475650		
A5R4	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A5R5	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A5R6	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A5R7	RESISTOR, MF, 4.7K, 1/4W, ±2%	471448	Corning	CL4
A5R8	RESISTOR, MF, 56K, 1/4W, ±2%	471474	Corning	CL4
A5R9	RESISTOR, Comp, 1M, 1/4W, ±10%	475678		
A5R10	RESISTOR, MF, 51K, 1/4W, ±2%	471473	Corning	CL4
A5R11	RESISTOR, Selected at Test			
A5R12	POTENTIOMETER, 10K, ±10%	479518	IRC	310-10K (Side Adj)
A5R13	RESISTOR, MF, 20K, 1/4W, ±2%	471463	Corning	CL4
A5R14	POTENTIOMETER, 5K, ±10%	479517	IRC	310-5K (Side Adj)
A5R15	RESISTOR, Selected at Test			
A5R16	RESISTOR, MF, 22K, 1/4W, ±2%	471464	Corning	CL4
A5R17	RESISTOR, Comp, 10Ω, 1/4W, ±10%	475601		
A5R18	RESISTOR, MF, 100Ω, 1/4W, ±2%	471408	Corning	CL4
A5R19	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A5R20	RESISTOR, MF, 27K, 1/4W, ±2%	471466	Corning	CL4
A5R21	RESISTOR, MF, 150K, 1/4W, ±2%	471484	Corning	CL4
A5R22	RESISTOR, MF, 9.1K, 1/4W, ±2%	471455	Corning	CL4
A5R23	RESISTOR, MF, 5.1K, 1/4W, ±2%	471449	Corning	CL4
A5R24	RESISTOR, MF, 470Ω, 1/4W, ±2%	471424	Corning	CL4
A5R25	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A5R26	POTENTIOMETER, 1K, ±10%	479508	Allen Bradley	ZH1021
A5R27	RESISTOR, Selected at Test			
A5R28	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4

A5 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 2 of 3)
(Used on 571A-1 and 571B)

REF.	DESCRIPTION	P/N	MFR.	MFR. P/N
A5R29	RESISTOR, MF, 1.8K, 1/4W, ±2%	471438	Corning	CL4
A5R30	RESISTOR, MF, 10K, 1/4W, ±2%	471456	Corning	CL4
A5R31	RESISTOR, Selected at Test			
A5R32	RESISTOR, MF, 18K, 1/4W, ±2%	471462	Corning	CL4
A5R33	RESISTOR, MF, 8.2K, 1/4W, ±2%	471454	Corning	CL4
A5R34	RESISTOR, MF, 100Ω, 1/4W, ±2%	471408	Corning	CL4
A5R35	RESISTOR, MF, 220Ω, 1/4W, ±2%	471416	Corning	CL4
A5R36	RESISTOR, MF, 4.7K, 1/4W, ±2%	471448	Corning	CL4
A5R37	RESISTOR, Comp, 10Ω, 1/4W, ±10%	475601		
A5R38	RESISTOR, MF, 22K, 1/4W, ±2%	471464	Corning	CL4
A5R39	RESISTOR, MF, 51Ω, 1/4W, ±2%	471401	Corning	CL4
A5R40	RESISTOR, MF, 30K, 1/4W, ±2%	471467	Corning	CL4
A5U1	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A5U2	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A5U3	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A5U4	INTEGRATED CIRCUIT, Op. Amp., LM318H	480674	Nat. Semi.	LM318H
A5U5	INTEGRATED CIRCUIT, Op. Amp., LM301AH	480655	Nat. Semi.	LM301AH
A5VR1	DIODE, Zener, 39V, 1N5259	480076	Motorola	1N5259
A5VR2	DIODE, Zener, 6.2V, 1N827	480011	IRC	1N827
A5VR3	DIODE, Zener, 22V, 1N4748	480061	Motorola	1N4748
A5X	P.C. BOARD Only	936305	▲	
	HEATSINK (Mod.)	928904	▲	

A5 PRINTED CIRCUIT BOARD ASSEMBLY PARTS LIST (Sheet 3 of 3)
(Used on 571A-1 and 571B)

ITEM	USED FOR	QTY.	P/N	MFR.	MFR. P/N	COMMENTS
ADAPTER	Heat Duct	1	922299	▲		Part of 948486
BRACKET	Cable Tie-Down	1	922302	▲		
BRACKET, Slide	Insertion into 540	2	928894	▲		
COVER, Bottom		1	916104	▲		
COVER, Filter	Rear Panel	1	916128	▲		Part of 948486
COVER, Top		1	916108	▲		
DRUM, Dial, 3-Band	571A-2	1		▲		
DRUM, Dial, 4-Band	571A-1, 571B	1	948523	▲		
FALSE BOTTOM		1	916132	▲		
FILTER, Air	Back Panel	1	934200	▲		Part of 948486
GUIDE, Plug-in	Bottom Panel	1	928772	▲		
KNOB, Pull	Plug-in Removal/ Insertion	1	580021	▲		
KNOB, Red	Tracking Voltage Adj.	1	960006	▲		Part of 948486
KNOB, Black	Power		962071	▲		
PANEL, Front, Black	571B	1	915122	▲		
PANEL, Front, Silver	571A-1	1	915090	▲		
PANEL, Front, Silver	571A-2	1	915103	▲		
PANEL, Left Side		1	916131	▲		
PANEL, Rear		1	916130	▲		Part of 948486
PANEL, Right Side		1	916133	▲		
PANEL ASSY, Rear		1	948486	▲		
PUSHBUTTON, Black	All pushbutton switches	3	510051	IEE Schadow	FU12/BL	1/switch module
SUB-PANEL, Front		1	916135	▲		

6-21/22

950776/ 9-1-76

CHASSIS NON-STRUCTURAL MECHANICAL PARTS LIST (Sheet 1 of 1)

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
	SEE SHT 1		

COMPONENT VALUE CHART

REF. DESIG	ASSY NO. 946305-1 (571A-1)	ASSY NO. 946305-2 (571A-1)	ASSY NO. 946305-1 (571A-2)
C4	.001 µF 10% 200V (157010)	470 PF, 5%, 500V (155515)	.001UF, 10%, 200V (157010)
C16	15 PF, 5%, 500V (155463)	5 PF, 5%, 500V (155460)	15 PF, 5%, 500V (155463)
R2	6.8K, 2%, 1/4 W (471452)	6.2K, 2%, 1/4 W (471451)	6.8K, 2%, 1/4 W (471452)
R3	30K, 2%, 1/4 W (104872)	180K, 10%, 1/4 (475650)	75K, 5%, 1/4 W (101613)
R8	120K, 2%, 1/4 W (471482)	56K, 2%, 1/4 W (471474)	120K, 2%, 1/4 W (471482)
R9	510K, 5%, 1/4 W (101611)	1M, 10%, 1/4 W (475678)	560K, 5%, 1/4 W (101687)
R38	36K, 2%, 1/4 W (471469)	22K, 2%, 1/4 W (471468)	36K, 2%, 1/4 W (471469)
R20	82K, 2%, 1/4 W (471478)	27K, 2%, 1/4 W (471466)	82K, 2%, 1/4 W (471478)
R22	5.1K, 2%, 1/4 W (471449)	9.1K, 2%, 1/4 W (471455)	5.1K, 2%, 1/4 W (471449)
R40	47K, 2%, 1/4 W (471472)	30K, 2%, 1/4 W (471467)	47K, 2%, 1/4 W (471472)

NEXT ASSY	USED ON	QTY
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGLES ±
XX DEC ±
XXX DEC ±
SURFACE FINISH

	DRAWN	CHECK	ENG.	MFG.
DATE				

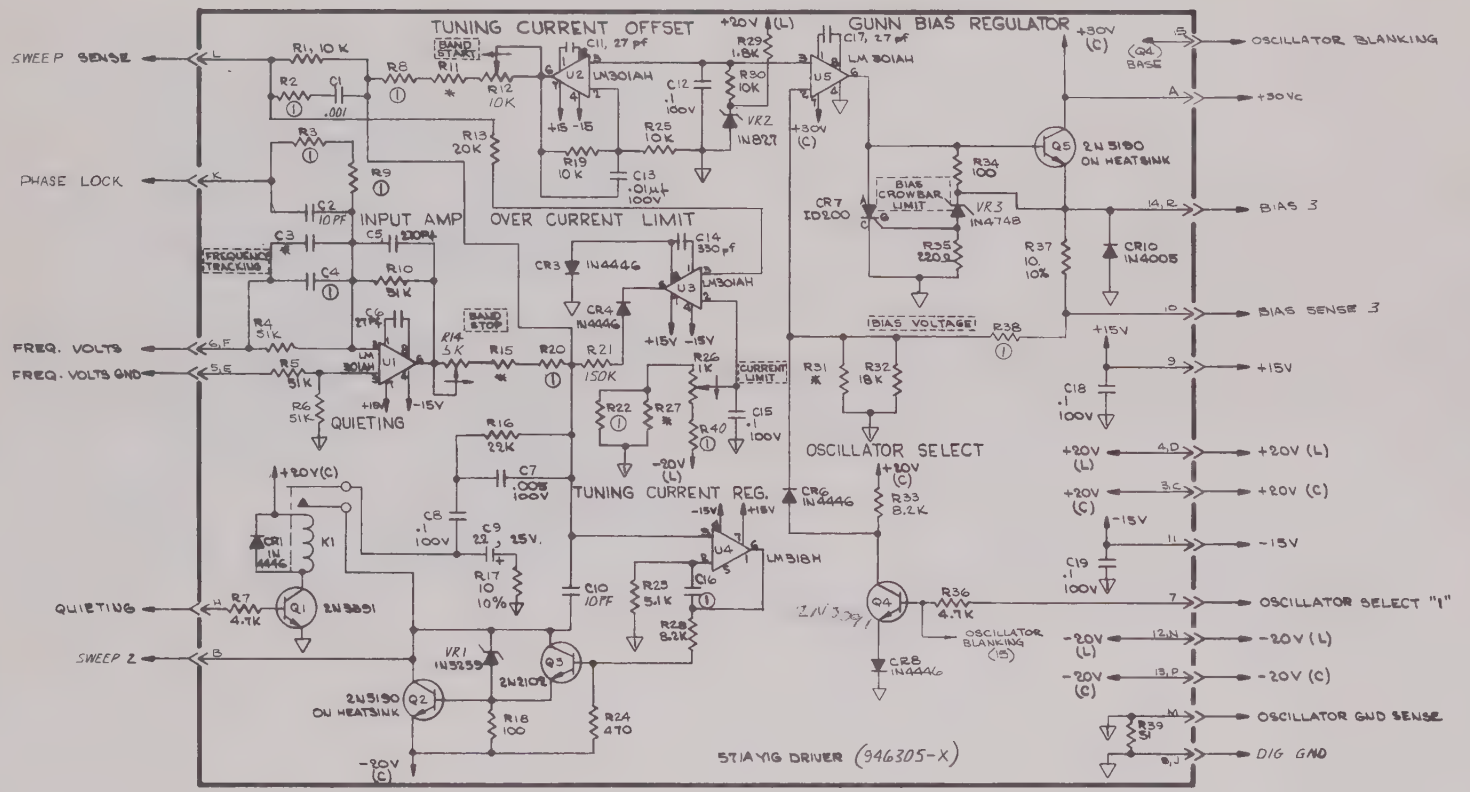
KRUGS ELECTRONICS DIVISION
SYSTRON DONNER CORPORATION

TITLE: SCHEMATIC 571A YIG DRIVER

CODE IDENT.	SIZE	DWG NO.	REV
29111	C	900500	

SCALE: SHEET 2 OF 2

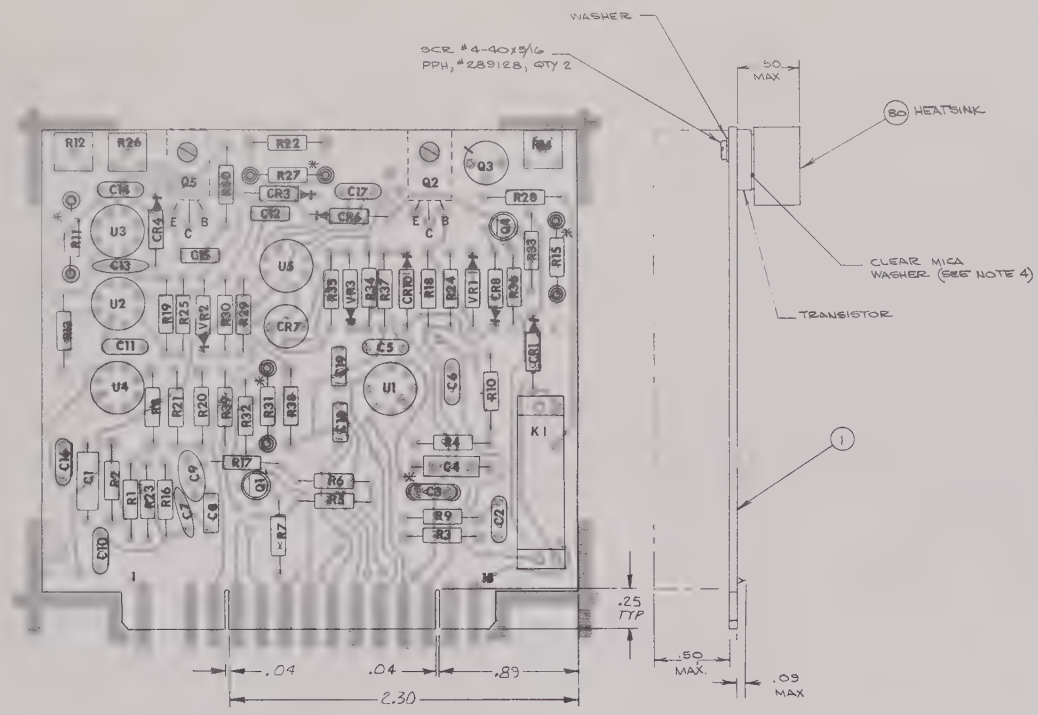
DATE	LTR	REVISION RECORD	AUTH.	DR	CK
1-30-74	-	ENG. RELEASE 217			
2-27-74	A	INCORP E.O. 10653 REL TO PRO E.O. 10727			



NOTES: UNLESS OTHERWISE SPECIFIED.
1. ALL RESISTORS ≤ 150K ARE 1/4W, 2% M.F.
2. ALL RESISTORS ≥ 150K ARE 1/4W, 10% COMP.
3. # INDICATES VALUES SELECTED AT TEST.
4. ① SEE CHART. (SHEET 2) FOR VALUES
5. ALL CAPACITORS < .001μf ARE 500 V, 5% MICA.
6. ALL POTENTIOMETER ARROWS INDICATES CW ROTATION.
7. ALL RESISTOR VALUES ARE: Ω
8. ALL CAPACITOR VALUES ARE μF

TOLERANCES (EXCEPT AS NOTED)	SYSTRON DONNER		
DECIMAL ± ~	USED ON: 5T1A-1 SERIAL NO:	SCALE ~	DRAWN BY T. RHODES APPROVED BY
FRACTIONAL ± ~	TITLE SCHEMATIC DIAGRAM YIG DRIVER		
ANGULAR ± ~	DATE 2-4-74	DRAWING NUMBER 900500 SHT 1 OF 2	REV A

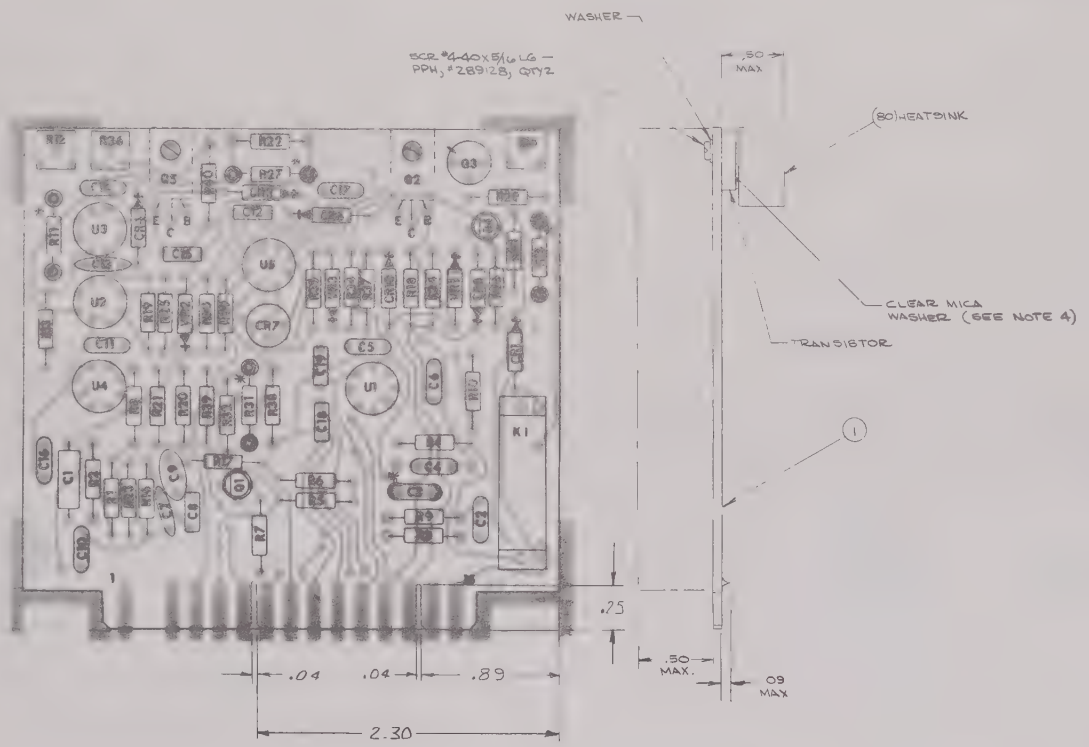
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
-	ENG REL / MRD 217	11-30-73	
1	ADDED KEYWAY SLOTS & CHANGED TITLE	3-14-74	



NOTES:
1. FOR SCHEMATIC SEE C 900500
2. FOR PARTS LIST SEE ML 946305-1
3. MARK REVISION APPROX. WHERE SHOWN.
4. INSTALL Q2 & Q5 WITH INCLUDED HARDWARE (AS SHOWN ON SIDE VIEW). IMPORTANT: LOAD TRANSISTORS WITH EXPOSED METAL SURFACE NEXT TO MICA WASHER.
5. INSTALL TRANSISTOR PAD UNDER Q3 & CR7.
6. * COMPONENTS (C3, R11, R15, R27, R31) ARE SELECTED BY TEST.
7. ADD KEYWAYS, AS SHOWN, PRIOR TO COMPONENT ASSEMBLY

			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH	KRUHE ELECTRONICS DIVISION SYSTRON DONNER CORPORATION	
			DRAWN T. RHODES	DATE 11-20-73	TITLE ASSEMBLY, P.C. BOARD - YIG DRIVER (BAND 2)
D 948482	571A	2	CHECK	2-8-74	CODE IDENT. 29111 / SIZE C / DWG NO. 946305-1 / REV 1
NEXT ASSY	USED ON	QTY	ENG.		SCALE 2/1 / SHEET 1 OF 1
APPLICATION			MFG.		

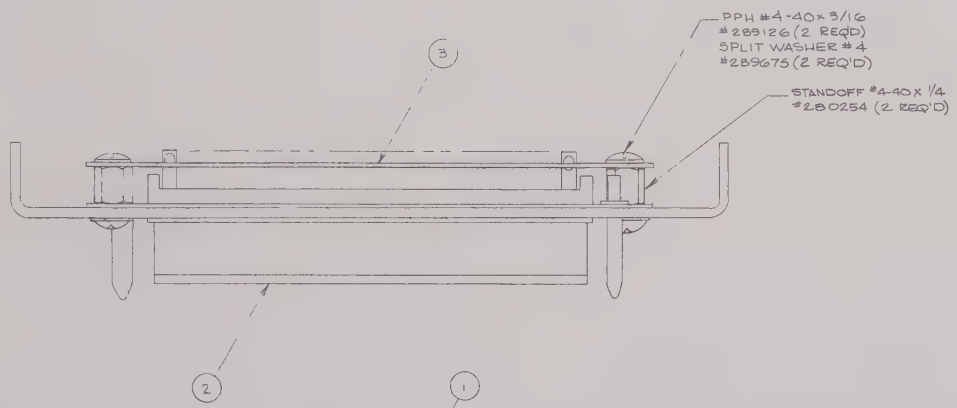
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
-	ENG REL MRD # 7	11-30-73	
1	ADDED SLOTS & CHANGED TITLE	7-16-73	

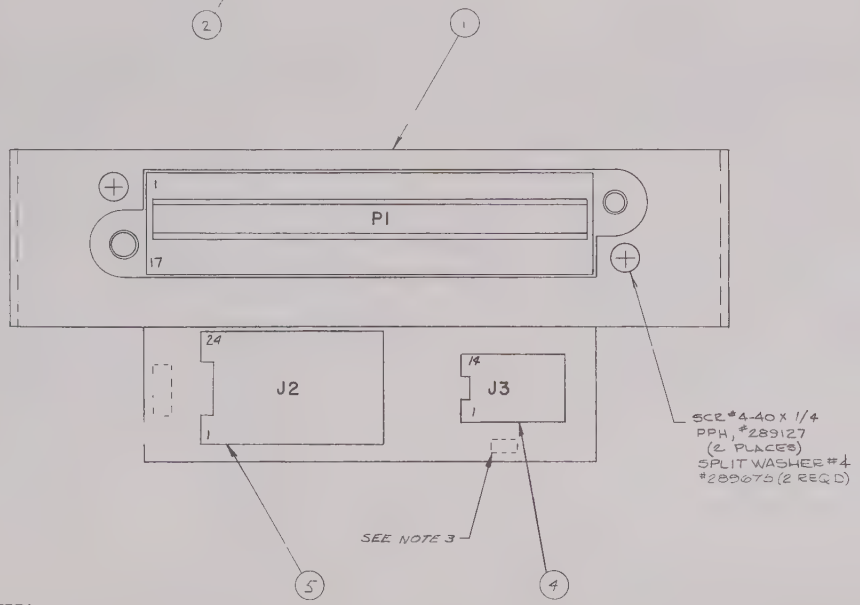


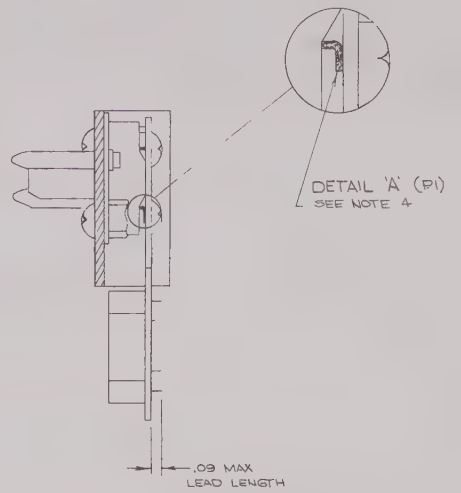
NOTES:
1. FOR SCHEMATIC SEE C 900500
2. FOR PARTS LIST SEE ML 946305-2
3. MARK REVISION APPROX. WHERE SHOWN.
4. INSTALL Q2 & Q5 WITH INCLUDED HARDWARE (AS SHOWN ON SIDE VIEW). IMPORTANT: LOAD TRANSISTORS WITH EXPOSED METAL SURFACE NEXT TO MICA WASHER.
5. INSTALL TRANSISTOR PAD UNDER Q3 & CR7.
6. * COMPONENTS (C3, R11, R15, R27, R31) ARE SELECTED BY TEST.
7. [illegible] AS SHOWN, PRIOR TO COMPONENT ASSEMBLY

			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH	KRUSE ELECTRODEVICE DIVISION SYSTRON DONNER CORPORATION	
				TITLE	ASSEMBLY, P.C. BOARD - Y16 DRIVER (BAND 3)
ML D 950676	571A-IM29	1	DRAWN T RHODES	DATE 11-20-73	
ML D 950673	571A-1	1	CHECK	2-8-74	CODE IDENT 29111 / SIZE C / DWG NO 946305-2 / REV 1
NEXT ASSY	USED ON	QTY	ENG	2-11-74	
APPLICATION			MFG		SCALE 2/1 / SHEET 1 OF 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
–	ENG REL. MRD 217	11-20-73	



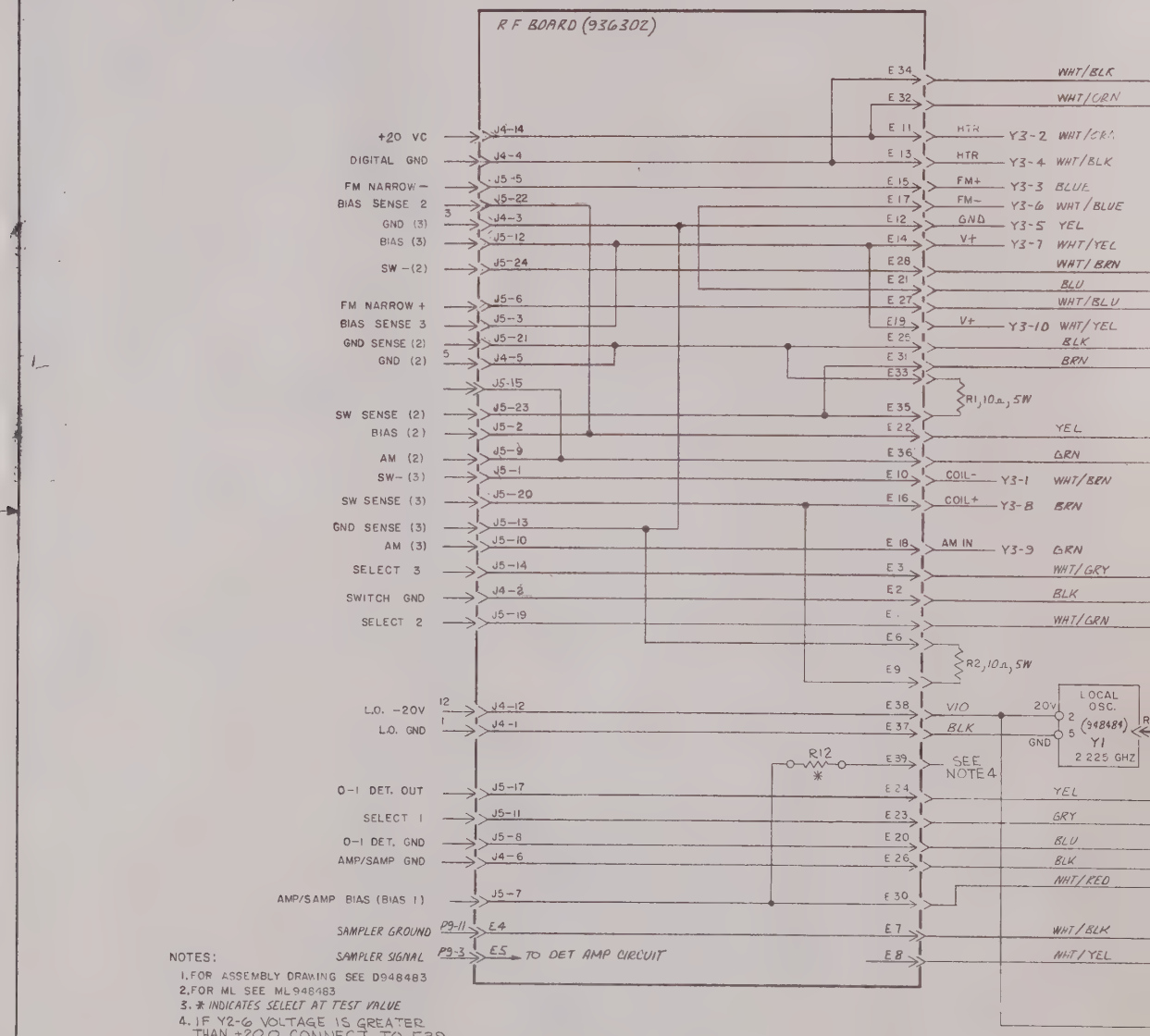




NOTES:

1. FOR SCHEMATIC DIAGRAM SEE D900496.
2. FOR PARTS LIST SEE ML 946304.
3. MARK APPROPRIATE REVISION LETTER, APPROXIMATELY WHERE SHOWN.
4. BEND CONNECTOR PINS (17 THROUGH 32) AS SHOWN (DETAIL 'A') BY INSTALLING STANDOFFS AND OTHER HARDWARE BEFORE SOLDERING CONNECTOR PINS TO BOARD.

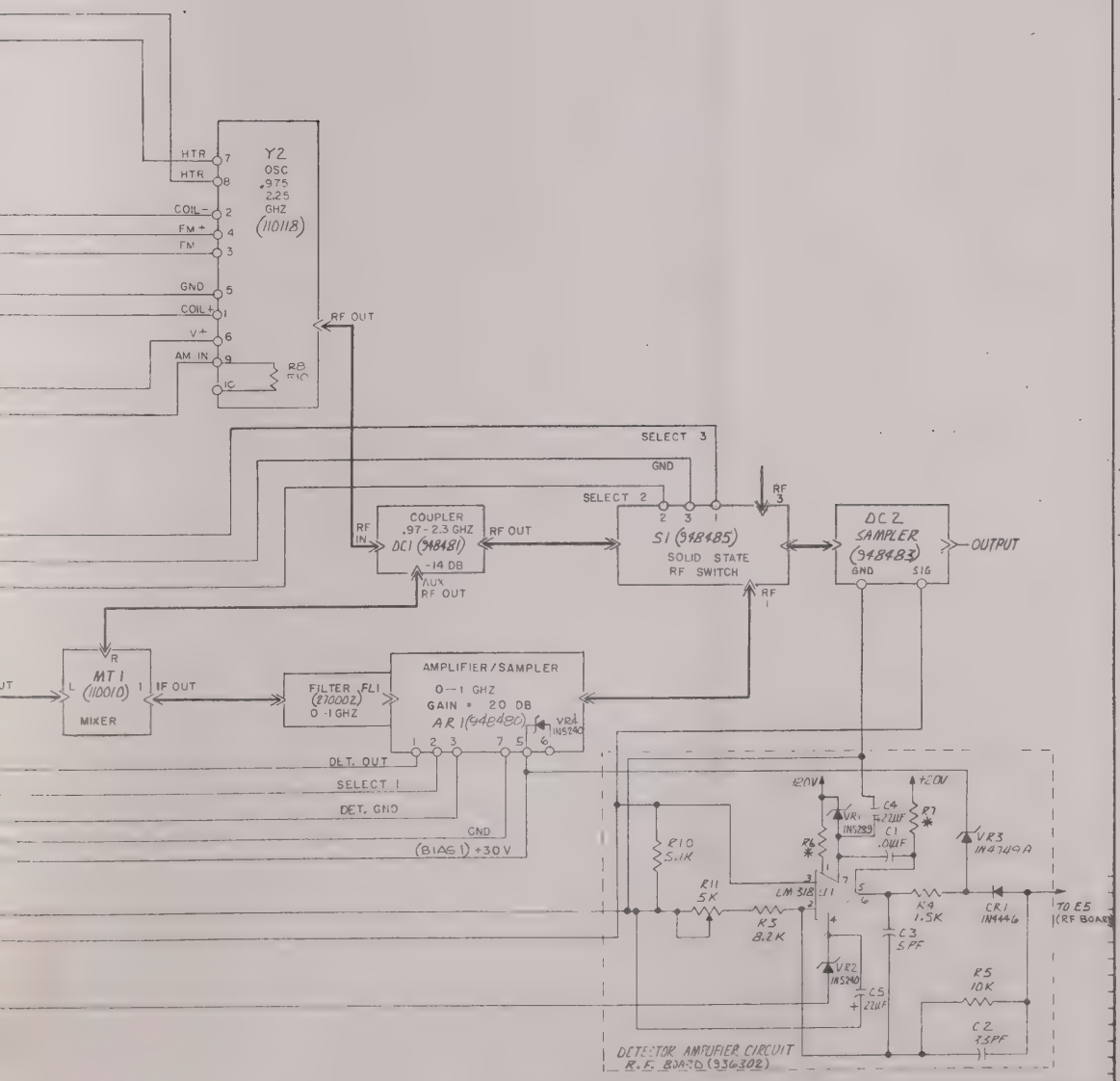
			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH		KRUSE ELECTRONICS DIVISION SYSTRON DONNER CORPORATION
			DRAWN T RHODES	DATE 10-30-73	TITLE CONNECTOR BOARD ASSEMBLY
B998482	571A-1	1	CHECK	11-20-73	CODE IDENT. 29111 / SIZE C / DWG NO. 946304 / REV –
NEXT ASSY	USED ON	QTY	ENG.	12-11-73	SCALE 2/1 / SHEET 1 OF 1
APPLICATION			MFG.		



NOTES:

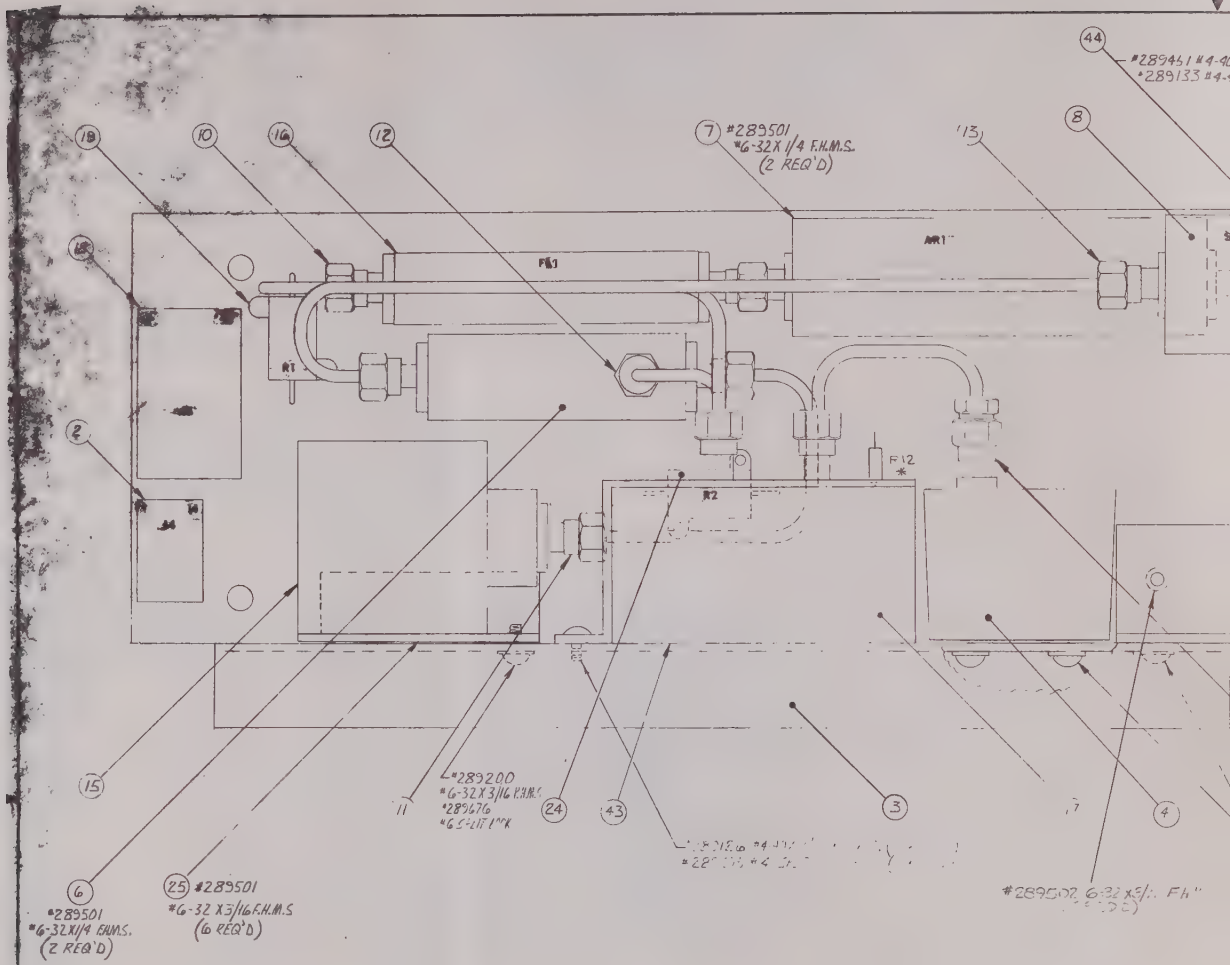
1. FOR ASSEMBLY DRAWING SEE D948483
2. FOR ML SEE ML948483
3. * INDICATES SELECT AT TEST VALUE
4. IF Y2-6 VOLTAGE IS GREATER THAN +20.0, CONNECT TO E39 IN PLACE OF E22

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
–	ENG REL PER MRD 217	2-5-74	
1	ADDED RB, R3 & DETECTOR AMPL. CIRCUIT	5-16-74	
2	REVISED CIRCUITRY	6-25-74	RJC
A	REV PER ECO 781	11-3-75	



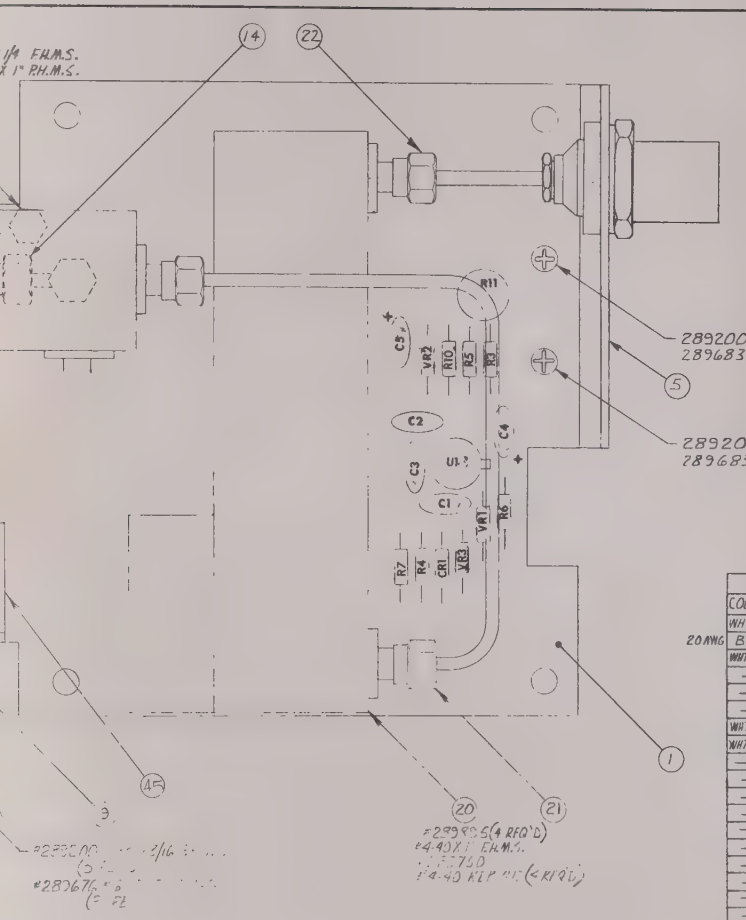
D900498

				UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH		BYSTRON DONNER ELECTRONICS DIVISION	
				DRAWN CRAGIN	DATE 12-8-72	TITLE SCHEMATIC RF SUB ASSEMBLY	
		571 A-2		CHECK	2-5-74	CODE IDENT 29111	SIZE D	DWG NO 900498	REV. A
NEXT ASSY	USED ON	QTY		ENG		SCALE		SHEET 1 OF 1	
APPLICATION				MFG					



5. ALL WIRES TO BE 22 AWG
4. USE WIRE TERMINATION #210131 AT ALL "E" TERMINALS EXCEPT E6, E9, E33 & E35
3. IDENTIFY WITH PART NO. & REV. LTR.
2. FOR SCHEMATIC SEE D900498
1. FOR PARTS LIST SEE ML

NOTES:



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
B	REVISED & REDRAWN BY C.T.	6-25-74	
A	REV PER ECO 736	5-19-75	
B	ECO 764 ADDED ITEM 45	7-22-75	
C	REV PER ECO 781	11-10-75	

WIRE LIST — SEE NOTES 4 & 5

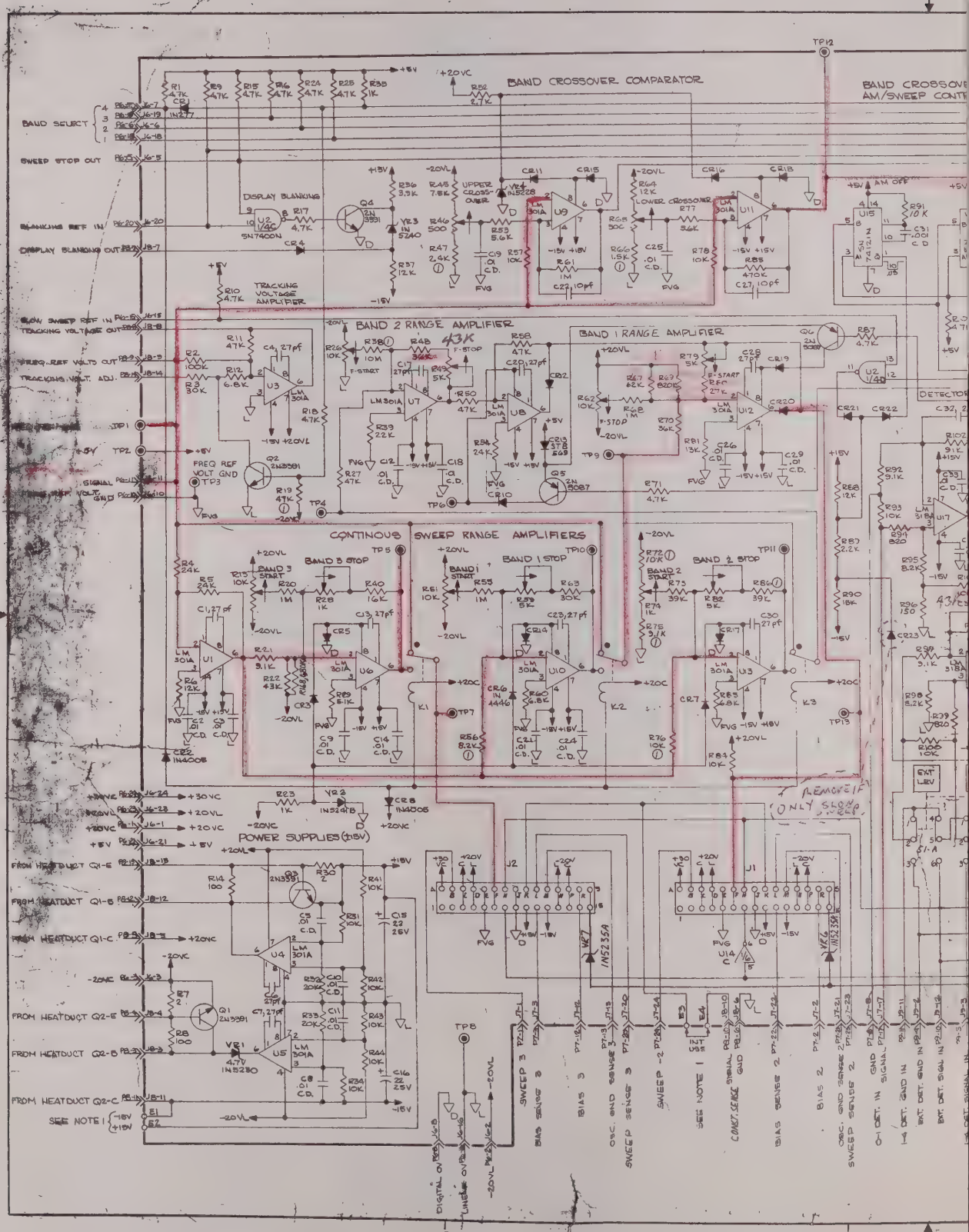
COLOR	FROM	TO	COLOR	FROM	TO	
WHT GRN	E1	S1-2	BLUE	E21	Y2-4	
20 AWG BLK	E2	S1-3	YEL	E22	Y2-6	
WHT GRY	E3	S1-1	GRAY	E23	AR1-2	
—	E4	NOT USED	YEL	E24	AR1-1	
—	E5	" "	BLK	E25	Y2-5	20 AWG
—	E6	R2	BLK	E26	AR1-7	20 AWG
WHT BLK	E7	DC2-GND	WHT BLU	E27	Y2-3	
WHT YEL	E8	DC2-S16	WHT BRN	E28	Y2-2	
—	E9	R2	—	E29	NOT USED	(NOT ON BD)
—	E10	NOT USED	WHT RED	E30	AR1-5	
—	E11	" "	BRN	E31	Y2-1	
—	E12	" "	WHT GRN	E32	Y2-7	
—	E13	" "		E33	R1	
—	E14	" "	WHT BLK	E34	Y2-8	
—	E15	" "		E35	R1	
—	E16	" "	GRN	E36	Y2-9	
—	E17	" "	BLK	E37	Y1-5	
—	E18	" "	VIO	E38	Y1-2	
—	E19					
J5	P2-1	J1-2				

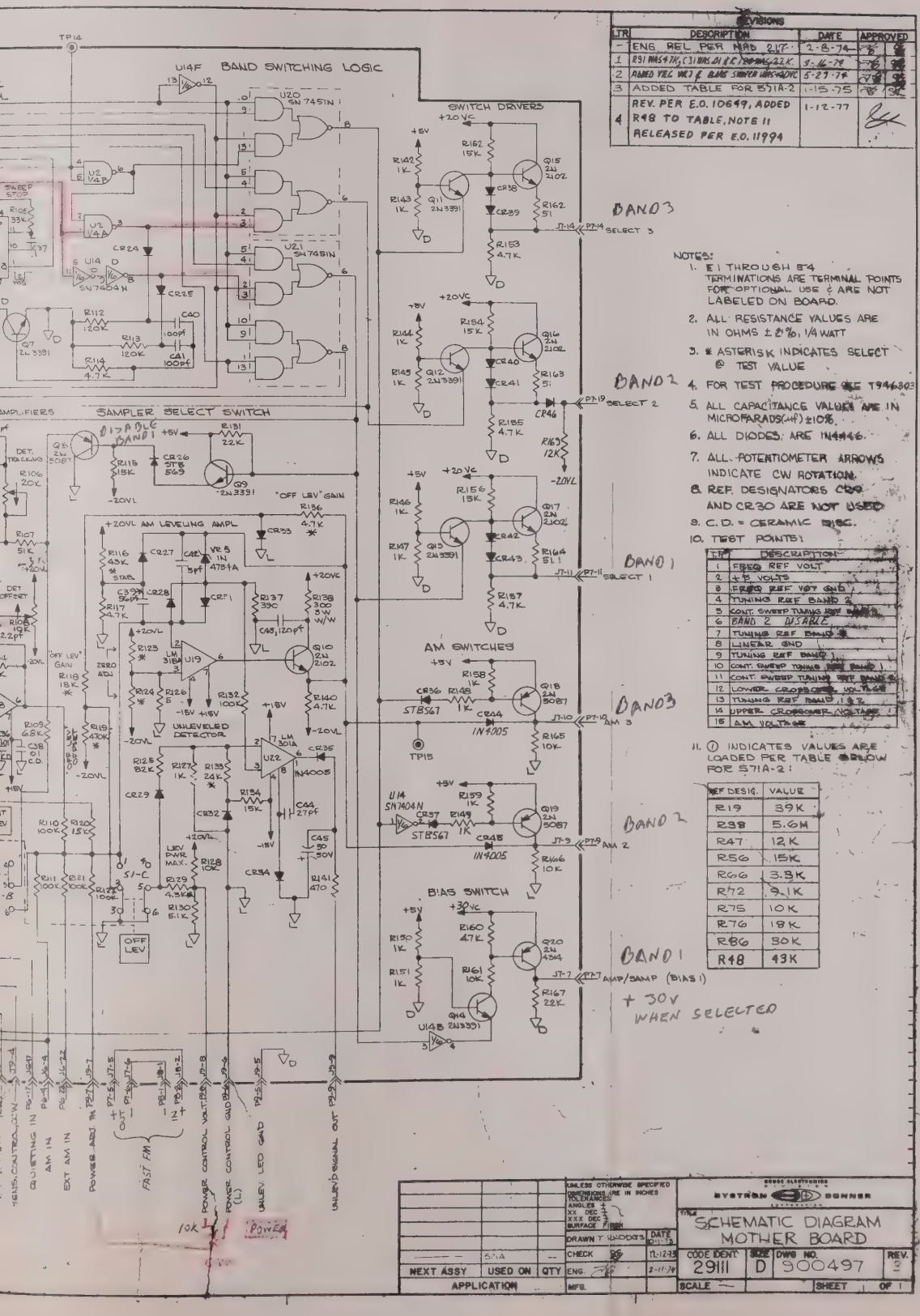
#289200 [illegible] 3/16 [illegible]
(3 [illegible]
#280676 [illegible]
(2 PL

#299805 (4 REQ'D)
#4-40X1/4 P.H.M.S.
#4-40 KEP NUT (4 REQ'D)

D9748483

			UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH	GOULD ELECTRONICS BYSTRON DONNER			
				TITLE R.F. SUB ASSEMBLY			
			DRAWN P.V.	DATE			
	371A-2	1	CHECK		CODE IDENT 29111	SIZE D	DWG NO [illegible] REV. C
NEXT ASSY	USED ON	QTY	ENG. K.H.				
APPLICATION			MFG		SCALE 2:1		SHEET 1 OF 1


BAND CROSSOVER COMPARATOR
BAND SELECT
SWEEP STOP OUT
BLANKING REF IN
DISPLAY BLANKING OUT
DISPLAY BLANKING
TRACKING VOLTAGE AMPLIFIER
BAND 2 RANGE AMPLIFIER
BAND 1 RANGE AMPLIFIER
CONTINOUS SWEEP RANGE AMPLIFIERS
BAND 3 STOP
BAND 1 STOP
BAND 2 STOP
POWER SUPPLIES (±15V)
FROM HEATDUCT Q1-E
FROM HEATDUCT Q1-B
FROM HEATDUCT Q1-C
FROM HEATDUCT Q2-E
FROM HEATDUCT Q2-B
FROM HEATDUCT Q2-C
SEE NOTE 1
REMOVE IF ONLY SLOW SWEEP


U14F BAND SWITCHING LOGIC
SWITCH DRIVERS
BAND 3
BAND 2
BAND 1
SAMPLER SELECT SWITCH
DISABLE BAND 1
"OFF LEV" GAIN
+20VL AM LEVELING AMPL
AM SWITCHES
BIAS SWITCH
UNLEVELED DETECTOR
NOTES:
1. E1 THROUGH E4 TERMINATIONS ARE TERMINAL POINTS FOR OPTIONAL USE & ARE NOT LABELED ON BOARD.
2. ALL RESISTANCE VALUES ARE IN OHMS ±2%, 1/4 WATT
3. * ASTERISK INDICATES SELECT @ TEST VALUE
4. FOR TEST PROCEDURE SEE T946803
5. ALL CAPACITANCE VALUES ARE IN MICROFARADS(uF) ±10%
6. ALL DIODES ARE 1N4446.
7. ALL POTENTIOMETER ARROWS INDICATE CW ROTATION.
8. REF. DESIGNATORS C29 AND CR30 ARE NOT USED
9. C.D. = CERAMIC DISC.
10. TEST POINTS:
11. ① INDICATES VALUES ARE LOADED PER TABLE BELOW FOR 571A-2:
+ 30V WHEN SELECTED
SCHEMATIC DIAGRAM MOTHER BOARD
D900497

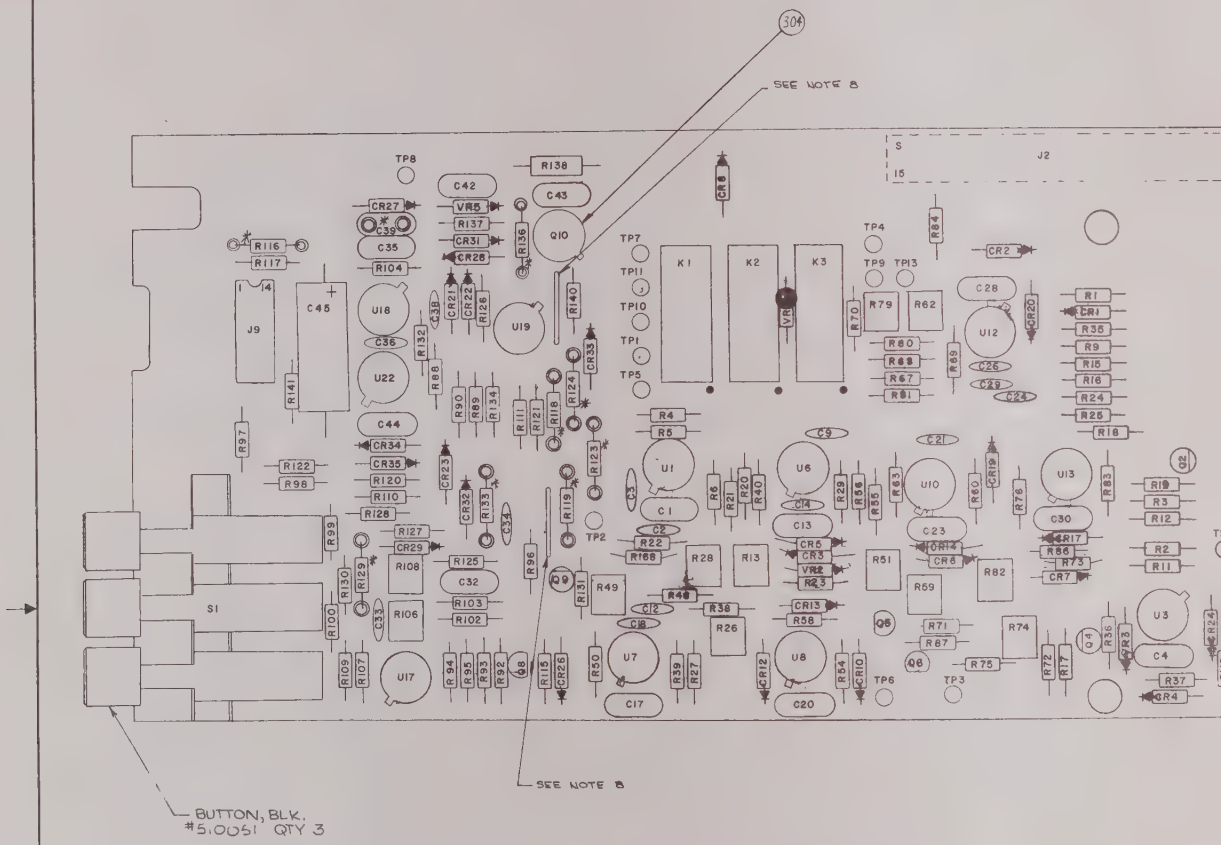
REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
-	ENG. REL PER MAD 217	2-8-74	
1	R91 WAS 47K, C1 WAS .01 & R WAS SHOWN AS 22K	3-14-74	
2	ADDED VEL VOLT & BAND SWITCH VOLTAGES	5-27-74	
3	ADDED TABLE FOR 571A-2	1-15-75	
4	REV. PER E.O. 10649, ADDED R48 TO TABLE, NOTE 11 RELEASED PER E.O. 11994	1-12-77	

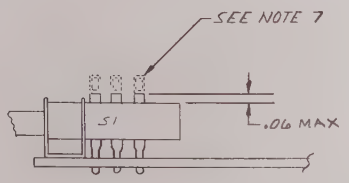
LTR	DESCRIPTION
1	FREQ REF VOLT
2	+5 VOLTS
3	FREQ REF VOT GND
4	TUNING REF BAND 2
5	CONT. SWEEP TUNING REF BAND 2
6	BAND 2 DISABLE
7	TUNING REF BAND 3
8	LINEAR GND
9	TUNING REF BAND 1
10	CONT. SWEEP TUNING REF BAND 1
11	CONT. SWEEP TUNING REF BAND 3
12	LOWER CROSSOVER VOLTAGE
13	TUNING REF BAND 1 & 3
14	UPPER CROSSOVER VOLTAGE
15	AM VOLTAGE

REF DESIG.	VALUE
R19	39K
R38	5.6M
R47	12K
R56	15K
R66	3.3K
R72	9.1K
R75	10K
R76	18K
R86	30K
R48	43K

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH					
DRAWN T WOODS			DATE 01-13-75		
CHECK			11-12-75		
ENG.			2-11-76		
MFG.					
NEXT ASSY	USED ON	QTY	APPLICATION		

SCALE		SHEET 1	OF 1
CODE IDENT 29111	SIZE D	DWG NO. 900497	REV. 2



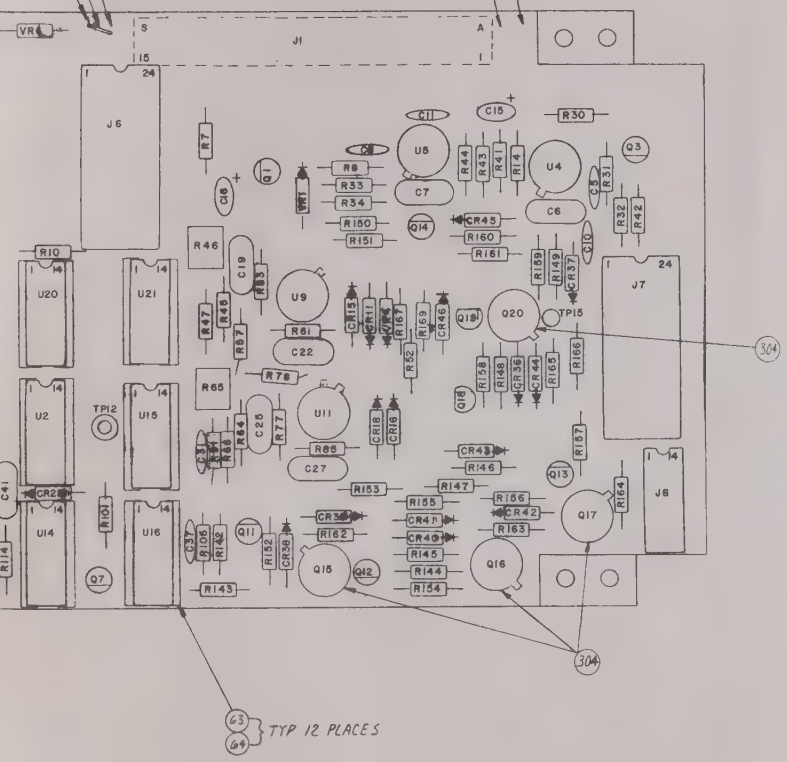


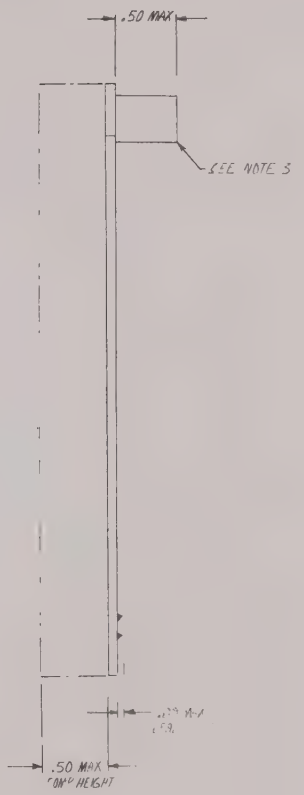
8. INSTALL #24 (BLK) INSULATED SOLID WIRE, APPROX 1/2" LONG.
7. TRIM S1 TERMINALS, AS SHOWN, AFTER SOLDERING
6. E1, E2, E3 & E4 ARE TERMINAL POINTS
5. * INDICATES SELECT AT TEST
4 MARK REVISION APPROX. WHERE SHOWN
3. CONNECTORS J1 & J2 MOUNTED ON NON-COMPONENT SIDE OF BOARD
2. FOR PARTS LIST SEE ML 946303
1. FOR SCHEMATIC SEE D 900497 & D900496

NOTES: UNLESS OTHERWISE SPECIFIED

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
–	ENGR REL PER MRD#217	2-8-74	
1	VR1,2,3,4,5 WAS CR	4-17-74	
2	ADDED CR46 & R169	5-15-74	
3	ADDED VR6 & VR7	5-23-74	

E3 (SEE NOTE 6)
#24 AWG BOSS WIRE
E4 (SEE NOTE 6)
E1 (SEE NOTE 6)
E2 (SEE NOTE 6)

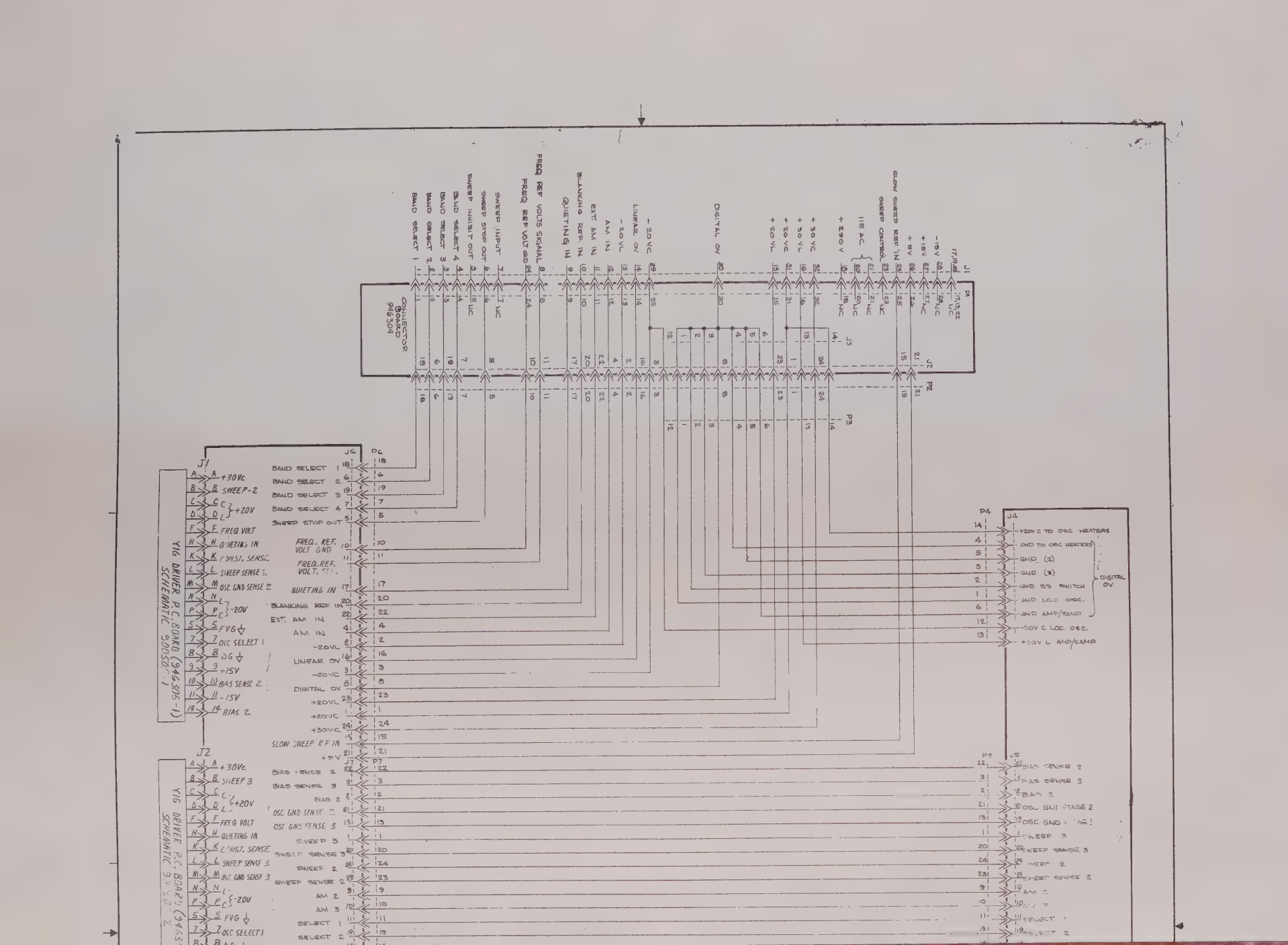




D946303

LASH ITLT CORP HANGER FINISS

				UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH	KRUPP ELECTRONICS SYSTRON DONNER		
				DRAWN J. RHODES	DATE 1-7-74	TITLE ASSEMBLY, PRINTED CIRCUIT	
D&M 948482	571A-1	1		CHECK	1-6-74	CODE IDENT 29111	SIZE D	DWG NO. 948482	REV.
NEXT ASSY	USED ON	QTY		ENG	2-1-74	SCALE 2/1		SHEET 1 OF	
APPLICATION				MFG					


CONNECTOR BOARD 946304
BAND SELECT 1
BAND SELECT 2
BAND SELECT 3
BAND SELECT 4
SWEEP INHIBIT OUT
SWEEP STOP OUT
SWEEP INPUT
FREQ REF VOLT GND
FREQ REF VOLTS SIGNAL
QUIETING IN
BLANKING REF. IN
EXT. AM IN
AM IN
- 20 VL
LINEAR 0V
- 20 VC
DIGITAL 0V
+ 20 VL
+ 30 VL
+ 30 VC
+ 20 VC
+ 250 V
115 AC
SWEEP CONTROL
SLOW SWEEP REF IN
+ 5V
+ 15V
- 15V
J1
P1
J2
P2
J3
P3
J4
P4
J5
P5
J6
P6
J7
P7
YIG DRIVER P.C. BOARD (946305-1) SCHEMATIC 9305D-1
YIG DRIVER P.C. BOARD (946305-2) SCHEMATIC 9305D-2
+30Vc
SWEEP-2
+20V
FREQ VOLT
QUIETING IN
CONST. SENSE
SWEEP SENSE 2
OSC GND SENSE 2
-20V
FVG
OSC SELECT 1
DG
+15V
BIAS SENSE 2
-15V
BIAS 2
SWEEP 3
OSC GND SENSE 3
SWEEP SENSE 3
SWEEP 2
SWEEP SENSE 2
AM 2
AM 3
SELECT 1
SELECT 2
+20V C TO OSC HEATERS
GND TO OSC HEATERS
GND (2)
GND (3)
GND SS SWITCH
GND LOC. OSC.
GND AMP/SAMP
DIGITAL 0V
+20V C LOC. OSC.
+20V L AMP/SAMP

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
—	ENG REL PER MRD 217	2-5-74	
1	ADDED J3 PINS 2 & 12	1-24-74	
2	OSC HEATER VOLTAGE WAS +30VDC	5-14-74	

Y3 (2-4 GHz OSC. 110113)

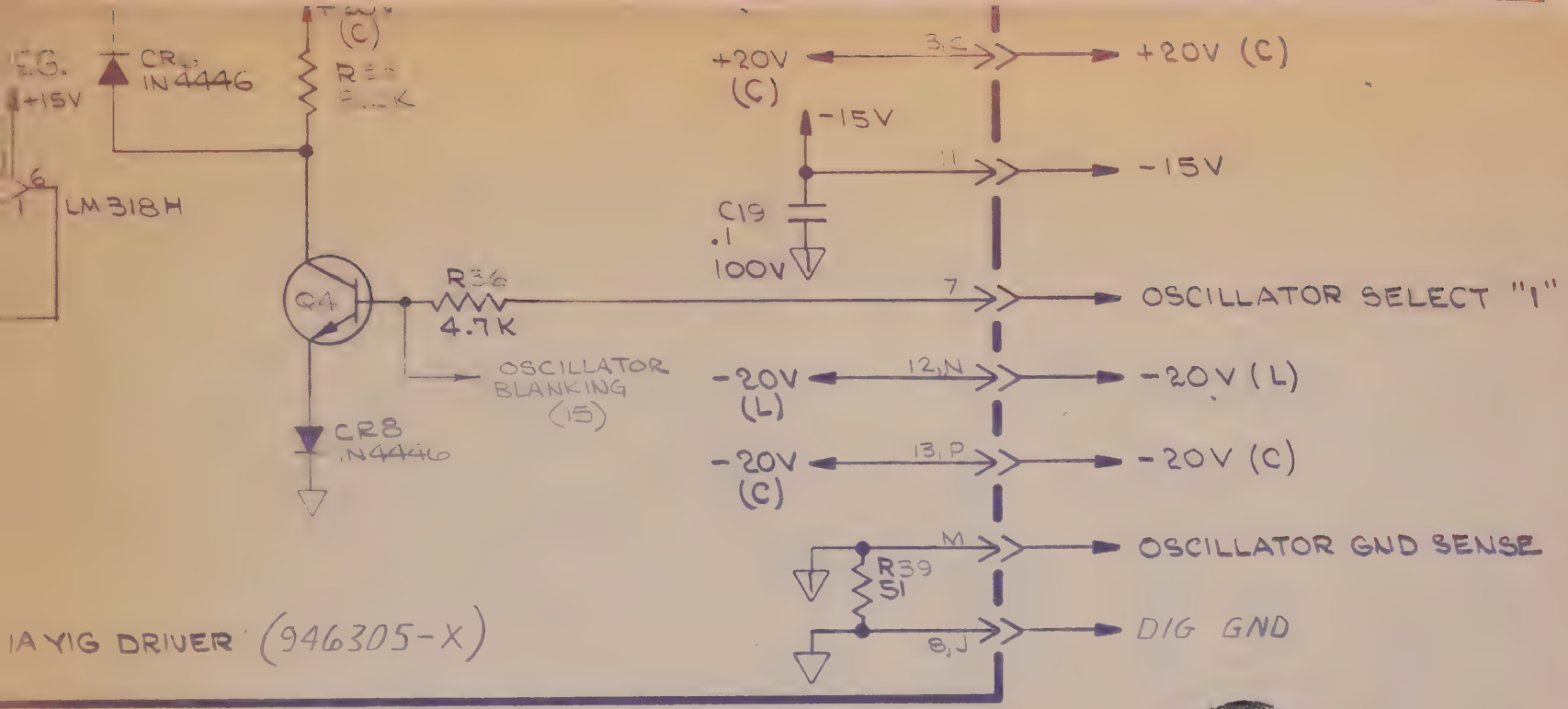
REAR PANEL

FRONT PANEL

MOUNT W/REAR HEATDUCT AS HEAT SINK.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ANGLES ± XX DEC ± XXX DEC ± SURFACE FINISH			SYSTRON DONNER
	DRAWN	DATE	TITLE: SCHEMATIC; INTERCONNECT
571A-1	CHECK		CODE IDENT. 29111 / SIZE D / DWG NO. 900496 / REV. 2
NEXT ASSY / USED ON / QTY	ENG		SCALE — / SHEET 1 OF 1
APPLICATION	MFG		

900496



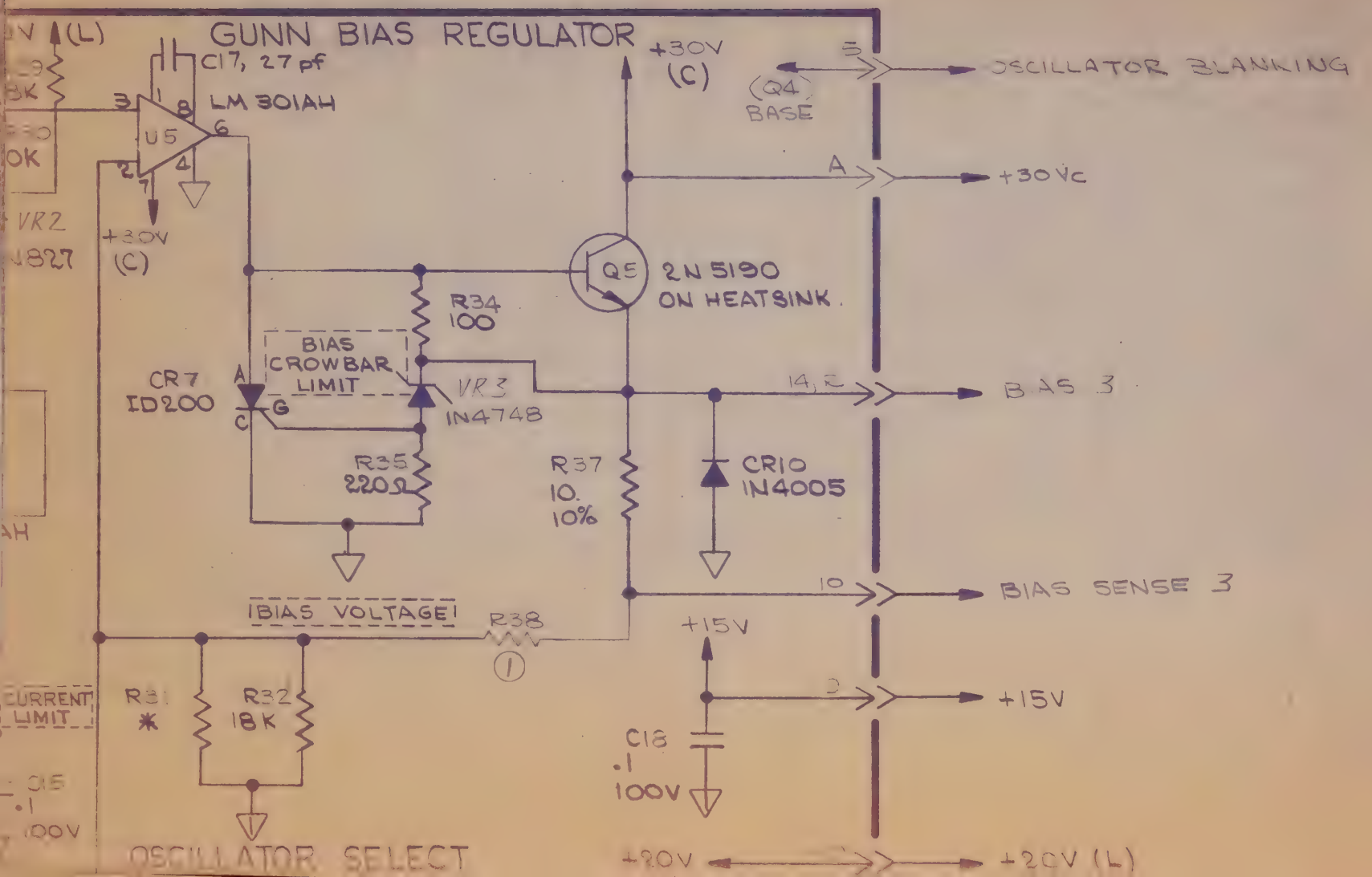
1A YIG DRIVER (946305-X)

DEC 1977
PRODUCTION
RELEASE

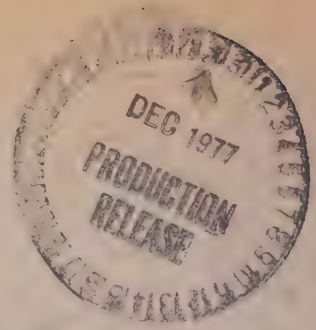
TOLERANCES (EXCEPT AS NOTED)	KRUSE ELECTRONICS SYSTRON DONNER		
DECIMAL ± ~	USED ON: 571A-1 SERIAL NO:	SCALE ~	DRAWN BY T. RHODES APPROVED BY
FRACTIONAL ± ~	TITLE SCHEMATIC DIAGRAM YIG DRIVER		
ANGULAR ± ~	DATE	DRAWING NUMBER 930500	REV A

MADE IN U.S.A.
29512

7-X	-	ENG. RELEASE 217			
12-27-65	A	INCREASE R.O. 10651 REL TO PRO E.O. 10929			



	1/4W (471473)	
R51	5.1K 2%	1/4W (471449)
R52	47K 2%	1/4W (471472)



NEXT ASSY	USED ON	QTY
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGLES ±
XX DEC ±
XXX DEC ±
SURFACE FINISH

DRAWN		DATE
CHECK		
ENG		
MFG		

KRUSE ELECTRONICS
SYSTRON DONNER

TITLE: SCHEMATIC STRIPPING DRIVER

CODE IDENT.	SIZE	DWG NO.	REV
29111	C	20056	

SCALE | SHEET 1 OF 1

E 22	[illegible]	[illegible]
E 43	41K, 22, 1/4 M (47/472)	30K, 22, 1/4 M (47/472)

COMPONENT VALUE CHART

REF. DESIG	ASSY NO. 946305-1 (571A-1)	ASSY NO. 946305-2
C4	.001 µF 10% 200V (157010)	470 PF, 5%, 500V (15
C16	15 PF, 5%, 500V (155463)	5 PF, 5%, 500V (15
R2	6.8K, 2%, 1/4 W (471452)	6.2K, 2%, 1/4 W (471
R3	30K, 2%, 1/4 W (104872)	180K, 10%, 1/4 (47
R8	120K, 2%, 1/4 W (471482)	56K, 2%, 1/4 W (47
R9	510K, 5%, 1/4 W (101611)	1M, 10%, 1/4 W (47
R38	36K, 2%, 1/4 W (471469)	22K, 2%, 1/4 W (471

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
	SEE SHT 1		

(571A-1)	ASSY NO.946305-1 (571A-2)
5515)	.001UF, 10%, 200V (157010)
5460)	15PF, 5%, 500V (155463)
451)	6.8K, 2%, 1/4W (471452)
5650)	75K, 5%, 1/4W (101613)
474)	120K, 2%, 1/4W (471482)
5678)	560K, 5%, 1/4W (101687)
64)	36K, 2%, 1/4W (471469)

MP MASTER
MA34062